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University of Cape Town

Faculty of Humanities

**Integrating children's art and environmental education:
exploring a nexus**

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DISSERTATION

**A minor dissertation in partial fulfilment of the requirements
for the award of the degree of Master of Philosophy in Education
(Teaching)**

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**This work has not been previously submitted in whole, or in part, for the award
of any degree. It is my own work. Each significant contribution to, and
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ABSTRACT

Current environmental problems necessitate the development of approaches that facilitate the acquisition of knowledge and nurture an affective personal response to the natural environment. To this end, the study explores connections between children's creation of art and environmental education, in the context of the theme of biodiversity. The research contributes to understanding children's learning experiences that may arise from the integration of visual art and environmental education by drawing on theory and empirical evidence.

The research was conducted at the Gold Fields Environmental Education Centre in the Kirstenbosch National Botanical Garden. Biodiversity was chosen as a relevant theme from which the children could learn about ecological concepts and conservation concerns. The study was guided by the research question: "What can workshops for children of nine to twelve years reveal regarding the nexus between creating art and environmental education about biodiversity?"

Case study was chosen as the methodology. The research was taken place over two five hour workshops for children in Grades 4 to 7 during the school holidays. After an introductory talk, the participants took part in a guided walk that was followed by an art project on the theme, using mixed media and incorporating dried plant material. The children explained their artworks to the researcher in interviews and written work.

The researcher analysed the children's artworks and explanations through identifying categories and sub-categories, which were described in detail. The comments made by an independent environmental educationalist about the artworks contributed to the researcher's understanding.

The findings showed that art and environmental education worked together in a synergistic way. Through the active learning processes of imagination, reflection and construction of meaning enabled by the art and its materials, the children were able to offer an affective personal response to a range of concepts about biodiversity. This resulted in detailed visual depiction which developed and consolidated the concepts and allowed for expression of feelings in relation to the theme of biodiversity.

LIST OF ABBREVIATIONS

AEE	Art-based environmental education
EE	Environmental education
EfS	Education for Sustainability
AS	Assessment Standard
C2005	Curriculum 2005
CAPE	Chicago Arts Partnership in Education
CARA	Conservation of Agricultural Resources Act
GET	General Education and Training
LO	Learning Outcome
NCS	National Curriculum Statement
NEEP	National Environmental Education Programme
RNCS	Revised National Curriculum Statement
SA	South Africa
SANBI	South African National Biodiversity Institute
SEED	Schools Environmental Education and Development
UCT	University of Cape Town
UK	United Kingdom
UNESCO	United Nations Educational, Scientific, and Cultural Organisation
UNEP	United Nations Environment Programme
USA	United States of America

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	i
ABSTRACT	iii
LIST OF ABBREVIATIONS	iv
CHAPTER ONE	1
INTRODUCTION	1
1.1 FOCUS OF STUDY	1
1.2 RATIONALE	1
1.2.1 Research on integrating art and environmental education	1
1.2.2 The theme of biodiversity	2
1.3 RESEARCH METHODOLOGY	3
1.4 RESEARCH QUESTION	4
1.5 AIMS AND OBJECTIVES	4
1.6 RESEARCH DATA AND ANALYSIS	4
1.7 CONCEPTUAL FRAMEWORK	5
1.8 STRUCTURE OF THE DISSERTATION	6
CHAPTER TWO	7
DISCOURSES, RESEARCH AND ASSOCIATED THEORIES ON INTEGRATING ART AND ENVIRONMENTAL EDUCATION	7
2.1 INTRODUCTION	7
2.2 DISCOURSES ON INTEGRATING ART AND ENVIRONMENTAL EDUCATION	8
2.2.1 The identification of discourses	8
2.2.2 <i>Active learning for environmental change, using an integrated curriculum approach</i>	8
2.2.2.1 <i>Active learning</i>	8
2.2.2.2 <i>Integrated curriculum</i>	10
2.2.2.3 <i>Social responsibility towards ecology in the USA: theory, practice and assertions</i>	13
2.2.2.4 <i>Education for the environment in South Africa: integrated curriculum in policy documents and curriculum guides</i>	16
2.2.3 <i>Creating art as a personal response to the environment</i>	20
2.2.3.1 <i>The nurturing of pro-environmental attitudes, sensitivity and an aesthetic appreciation of nature in environmental education</i>	20
2.2.3.2 <i>Personal responses to a theme or topic in an art medium, achieved through the senses, imagination, metaphor/symbol and reflection</i>	25
2.2.3.3 <i>Practice and assertions in Finland, UK, USA and SA</i>	27
2.3 RESEARCH	32
2.3.1 <i>Published empirical studies</i>	32
2.3.1.1 <i>Availability</i>	32
2.3.1.2 <i>Research article</i>	32
2.3.1.3 <i>Research report for teachers</i>	33
2.3.1.4 <i>Research on the integration of art and environmental education as part of larger projects</i>	34
2.3.1.5 <i>Use of visual art as a research instrument for children's responses to the environment</i>	35
2.3.2 <i>Unpublished research studies</i>	37
2.4 CONCLUSION	37
CHAPTER THREE	39
METHODOLOGY FOR RESEARCHING CHILDREN'S LEARNING EXPERIENCES THROUGH ART	39
3.1 INTRODUCTION	39
3.2 THE CASE STUDY	39
3.2.1 The site and programme	39
3.2.2 Workshop details	39
3.3 RESEARCH METHODOLOGY	41
3.3.1 Case study	41

3.3.2 Qualitative research	41
3.4 RESEARCH ETHICS	42
3.4.1 Ethics form	42
3.4.2 Consent from the site of research	42
3.4.3 Consent from children and parents	42
3.4.4 Ethics in data collection, analysis and reporting	43
3.5 THE RESEARCHER'S PREVIOUS STUDIES	43
3.5.1 Research projects	43
3.5.2 Pilot study	44
3.6 THE ROLE OF TEACHER AS RESEARCHER	44
3.6.1 Methodologies for teacher-researchers	44
3.6.2 The question of objectivity	45
3.6.3 The practical considerations of researching the case as teacher	46
3.7 DATA COLLECTION AND ANALYSIS	46
3.7.1 Overview	46
3.7.2 The observations	48
3.7.2.1 Data collection	48
3.7.2.2 Analysing the data	48
3.7.3 The artworks	49
3.7.3.1 Collecting the data	49
3.7.3.2 Analysing the data	49
3.7.4 The interviews	50
3.7.4.1 Collecting the data	50
3.7.4.2 Analysing the data	50
3.7.5 The questionnaires	51
3.7.5.1 Collecting the data	51
3.7.5.2 Analysing the data	51
3.7.6 The written work	52
3.7.6.1 Collecting the data	52
3.7.6.2 Analysing the data	52
3.7.7 Interviews with an environmental educationalist about the artworks	52
3.7.7.1 Collecting the data	52
3.7.7.2 Analysing the data	53
3.7.8 The interviews on returning the artworks	53
3.7.8.1 Collecting the data	53
3.7.8.2 Analysing the data	53
3.8 VALIDITY AND RELIABILITY	54
3.8.1 Internal validity	54
3.8.2 Reliability	54
3.8.3 External validity	55
3.9 APPLICATION TO THE DATA	55
CHAPTER FOUR	56
CHILDREN'S ARTWORKS AND EXPLANATIONS REVEALING THEIR LEARNING EXPERIENCES	57
4.1 INTRODUCTION	57
4.2 TYPES OF DEPICTION (LITERAL/METAPHORIC/SYMBOLIC AND IMAGINATIVE/OBSERVATIONAL)	59
4.2.1 Method of identification of types of depiction	59
4.2.2 Literal, metaphoric and symbolic depiction	59
4.2.2.1 <i>Literal depiction</i>	59
4.2.2.2 <i>Metaphoric and symbolic depiction</i>	61
4.2.3 Imagination and observation in depiction	62
4.3 CONCEPTS DEPICTED	63
4.3.1 Method of identification of the concepts	63
4.3.2 Concepts dominant in each artwork	65
4.3.2.1 <i>Collating and recording the dominant concepts</i>	65
4.3.2.2 <i>The general concepts</i>	65
4.3.2.3 <i>The dominant concepts about the environment</i>	66
4.3.2.4 <i>Variations of the dominant concepts about the environment</i>	67
4.3.2.5 <i>Individualised development of concepts when the dominant concept about the environment or its variation is the same in artworks</i>	69
4.3.3 The depiction of concepts associated with the dominant concepts	69

4.3.3.1 Collating the associated concepts.....	69
4.3.3.2 The general concepts depicted	70
4.3.3.3 Individualised development of concepts through the associated concepts about the environment ?1	71
4.3.4 Concepts as part of the nexus of art education and environmental education	74
4.3.4.1 Concepts in these workshops and in writings on the integrating of art and environmental education	74
4.3.4.2 The imaginative possibilities of concepts	76
4.4 PERSONAL RESPONSES EXPRESSED ABOUT THE CONCEPTS.....	79
4.4.1 Method of identification of the personal responses expressed about the concepts.....	79
4.4.2 Personal responses about the dominant and associated concepts	81
4.4.2.1 Collating the personal responses.....	81
4.4.2.2 Personal responses about dominant concepts about the environment.....	81
4.4.2.3 Differences in explicitness.....	82
4.4.2.4 Variations with regard to personal responses about the concepts.....	84
4.4.3 Personal responses expressed about the concepts as part of the nexus of art education and environmental education	85
4.4.3.1 Pro-environmental attitudes and sensitivity, such as concern and aesthetic appreciation of nature	85
4.4.3.2 Imaginative possibilities related to personal responses about concepts.....	86
4.5 USE OF MATERIALS.....	88
4.5.1 Introduction	88
4.5.2 Sensory experience depicted and re-experienced	88
4.5.3 Dried plants and feathers.....	89
4.5.3.1 Art materials that connect art and environmental education.....	89
4.5.3.2 Method for counting the ways used	90
4.5.3.3 Different ways plant material and feathers were used in the artworks.....	90
4.5.3.4 Use of imagination	92
4.5.3.5 Use for depiction of concepts and personal responses.....	94
4.6 CONCLUSION.....	96
CHAPTER FIVE.....	97
CONCLUSION	97
5.1 THE NEXUS OF ART AND ENVIRONMENTAL EDUCATION	97
5.1.1 Overview	97
5.1.2 The development of concepts imbued with an affective personal response	97
5.2 RECOMMENDATIONS	101
5.2.1 Application to practice	101
5.2.2 Further research.....	103
LIST OF REFERENCES	105
APPENDICES.....	120
APPENDIX 1	122
APPENDIX 2	132
APPENDIX 3	204
APPENDIX 4	215
APPENDIX 5	221

LIST OF TABLES

TABLE 1: PLANT MATERIAL AND FEATHERS MAINLY TO FACILITATE VISUAL REPRESENTATION	91
TABLE 2: PLANT MATERIAL AND FEATHERS TO FACILITATE BOTH VISUAL REPRESENTATION AND THE DEPICTION OF CONCEPTS ABOUT THE ENVIRONMENT	92
TABLE 3: PLANT MATERIAL AND FEATHERS WHERE DEPICTION OF CONCEPTS ABOUT THE ENVIRONMENT PREDOMINATES	92

University of Cape Town

CHAPTER ONE

INTRODUCTION

1.1 Focus of Study

The study explores connections between children's creation of art and environmental education, in the context of the theme of biodiversity. The focus is on children's learning experiences arising from the integration of visual art and environmental education. The nexus of the two areas of learning enhances the consolidation of concepts and the development of personal responses to the environment through the artistic processes of imagination, depiction and reflection.

1.2 Rationale

1.2.1 Research on integrating art and environmental education

Current environmental problems necessitate the development of approaches that facilitate acquisition of knowledge and nurture a personal response of appreciation of the natural environment and concern for it (Orr, 2004:8; Palmer, 1998:273). Nurturing sensitivity and pro-environmental attitudes has been regarded as a significant part of environmental education from its early history (Chawla, 1998; Iozzi, 1989a; 1989b; Sward and Marcinkowski, 2005; UNESCO / UNEP,¹ 1976; 1978).

In an integrated curriculum, the bounds of subjects or disciplines are crossed when more than one discipline is used simultaneously. The nexus of the disciplines includes shared concepts, skills and goals. The emphasis is on learning that is meaningful to the pupils' own lives (Drake, 1998; Beane, 1997; Brazee and Capelluti, 1995; Fogarty, 1991; 2002). Environmental education itself is an interdisciplinary endeavour (Palmer, 1998:98; UNESCO/UNEP, 1978).

¹ United Nations Educational, Scientific, and Cultural Organisation/United Nations Environment Programme.

An intuitive understanding exists amongst many visual art and environmental educators that creating art about the natural environment fosters observational skills, the acquisition or consolidation of some knowledge, positive feelings towards nature, as well as sensitisation and awareness of environmental issues. The natural environment is also recognised as a rich source of stimulus for creating art (Joicey, 1993; Cohen, 1986). Although the creation of art has been used together with environmental education in varying ways by teachers particularly in the last two decades, there is a paucity of published research on the integration of the two educational activities and the learning experiences involved. Educational practitioners use and report on the combination, but little empirical research has been conducted on the relationship between them.¹ Assertions in the academic and descriptive literature regarding the benefits of teaching and learning about the environment through the integration of visual art and environmental education have a limited foundation in research. As a result, there is a lack of definition as to how the integration of art and environmental education supports learning.

1.2.2 The theme of biodiversity

Biodiversity is commonly defined as the variety of species, genetic variability within species and the variety of habitats supporting varied communities of species (Gaylord, 2000:349, 353). The workshops dealt with the first aspect contained in the definition and to a lesser extent the third aspect. Biodiversity was chosen as being an appropriate theme to use to explore the nexus between the creation of art and environmental education.

The conservation of biodiversity is of current concern. There is a need to contribute to effective ways of teaching about the range of concepts associated with biodiversity and nurturing an affective response to the issue.

The theme is of relevance to the biophysical context of the empirical research. The site of the research was the Gold Fields Environmental Education Centre in the

¹The researcher traced only two published papers on integrating art and environmental education (Holmes, 2002; Savva, Trimis and Zachariou, 2004) through searching databases. However, there are several research papers which use drawings, paintings or collages as a means for ascertaining children's perceptions about the environment (described in section 2.3.1.5).

Kirstenbosch National Botanical Garden, which falls within the borders of the Table Mountain National Park, Cape Town. The Garden is a rich resource for teaching about biodiversity as it contains many indigenous species.¹ Kirstenbosch is part of the Cape Floristic Region Protected Areas World Heritage Site, so proclaimed in 2004 because of the need to conserve its threatened diverse flora and ecological processes. The Biodiversity Act (Republic of South Africa, 2004) included the establishment of the South African National Biodiversity Institute (SANBI), the umbrella body for national botanical gardens (2004:24–40), to replace the National Botanical Institute.²

Biodiversity is a concept that is not rigidly defined and can be adapted for teaching in different contexts, to various age groups and with several pedagogical emphases in environmental education (Van Weelie and Wals, 2002). As a theme it lends itself to depiction in art because of the variety of species in the natural environment which can be portrayed in an artwork. The theme also offers choices of concepts for depiction.

1.3 Research Methodology

Case study was chosen as the methodology, owing to the complexity of a research focus dealing with learning experiences. The case consisted of two five hour workshops on the theme of biodiversity held for Grades 4 to 7 in the school holidays. Sixteen children attended each workshop. The children were introduced to the theme in the classroom, then taken on a guided walk and shown plant specimens under the video-microscope. These activities were followed by an art project comprising of making collages made with art media, coloured modelling beeswax, dried plant material and feathers.

The researcher has been teaching about environmental themes, topics and issues at the Centre in workshops during the school holidays for the past twelve years. The structure of the workshop and means of publicly advertising for the children remained the same for the researched workshops, in order to keep the workshop and the profile of participants similar to other holiday workshops in the programme. In this way, the

¹ There were 6,763 accessioned indigenous species in Kirstenbosch in July 2007. Those growing wild in Kirstenbosch are not included in this count (Notten, 2008).

² The website for SANBI is <http://www.sanbi.org>

researched workshops maintained their authenticity in relation to the existing programme.

1.4 Research Question

The researcher observed in previous workshops that the children depicted the teaching content and their personal experiences in the artworks they were given the opportunity to make. In order to understand more about the link between creating art and environmental education about biodiversity, the researcher framed the question: "What can workshops for children of nine to twelve years reveal regarding the nexus between creating art and environmental education about biodiversity?"

1.5 Aims and Objectives

The study aims to contribute to understanding the learning experiences of children when visual art and environmental education are integrated. As central theories about learning experiences at the nexus of the two fields of education are lacking, the dissertation intends to draw together appropriate theories from art and environmental education pertaining to empirical evidence from this research. These theories are described in the literature review, analysis and conclusion. The selection of theories is based on the children's development and consolidation of understanding about biodiversity and affective responses to the theme through their active learning from the practical art. The scope of the dissertation is defined by the length and level of study required for a minor dissertation of a masters degree.

1.6 Research Data and Analysis

The researcher analysed the children's artworks and their explanations of the pictures after they had completed them. The data collected comprised the artwork, the interview (transcribed) and the written work of each child. Also included were transcripts of interviews with an environmental educationalist about the artworks. The workshops were videotaped and audiotaped (subsequently transcribed) and the researcher made notes on her observations during the workshops.

When examining the data sources, the analysis involved creating categories, as themes became predominant through repetition. Two of the categories identified that shaped the dissertation were 'Concepts depicted' and 'Personal responses expressed about the concepts.' Two other categories were 'Types of depiction' (in terms of literal, symbolic and metaphoric elements as well as in terms of the use of imagination and observation) and 'Use of materials.' Detailed analysis provided descriptions of sub-categories within each category.

The artwork, interview and written work of each child were compared to each other to identify the concepts and personal responses to biodiversity contained in them. Comments made by the environmental educationalist about the artworks reinforced and enriched the researcher's understanding of each child's concepts and the personal responses. The artworks were also examined for imagination as well as the use of plant material and their effect on the children's depiction of concepts and their personal responses to biodiversity. Researcher bias was reduced by the triangulation of the data sources and further by the opinions of the independent environmental educationalist.

1.7 Conceptual Framework

The researcher found it necessary to build a conceptual framework from theories and writings in different fields owing to the lack of theory regarding the nexus of art and environmental education. Concepts were chosen which were pertinent to understanding the nexus between art and environmental education in relation to the research data.

The concepts which frame the research were selected from the following: educational theory and writings about integrated curricula and construction of knowledge; theory and writings from environmental education about attitudes, sensitivity and aesthetic response; and theory and writings from art education about personal response, imagination, metaphor/symbol, sensory experience and reflection when creating art.

Taken together, these concepts build a framework for understanding active learning about biodiversity through imagination, depiction and reflection. Educationalists with an interest in the integration of the two fields of education have used some of these concepts from art education and environmental education in their theoretical writing. The concepts are described further in the next chapter which explores the literature.

Specific concepts have been identified by authors as relating to the nexus of art and environmental education, or concepts for teaching children about the artworks of professional artists on the theme of art and ecology. These concepts include those of location, change and time depicted, as well as the use of materials (Krug, 2002). These specific concepts were related to the artworks made by the children in the researcher's workshop.

1.8 Structure of the Dissertation

The following chapter expands on theory and concepts as it reviews the literature in terms of discourses and the existing research on integrating art and environmental education; the case study is explained in the third chapter in terms of case details, methodology and research design, as well as methods for data collection and analysis; the analysis of the artworks and the children's explanations about the artworks is contained in the fourth chapter which integrates data presentation and findings; and the dissertation is concluded with a discussion on the findings of the research in relation to the research question.

CHAPTER TWO

DISCOURSES, RESEARCH AND ASSOCIATED THEORIES ON INTEGRATING ART AND ENVIRONMENTAL EDUCATION

2.1 Introduction

This chapter reviews the literature on integrating art and environmental education for pupils in formal and non-formal contexts. The emphasis in the chapter is on knowledge and affective responses to the natural environment in art and environmental education, with reference to the theme of biodiversity either as a broad concept or group of concepts. The chapter is organised according to predominant discourses (including associated theories and assertions of practitioners), as well as discussions of published and unpublished research.

As there is presently no central theory for the integration of art and environmental education, this review highlights theories associated with the discourses on integrating environmental education and art education in order to build a theoretical framework for gaining understanding of the children's learning experiences. These experiences include children's development of concepts imbued with an affective personal response through imaginative and reflective processes when creating and describing the artworks.

Existing practices and the assertions of practitioners are also described, as the dissertation aims to provide evidence for statements arising out of practice, including those referring to related theories. The National Curriculum Statement (NCS) and its guides are discussed in terms of integrating art and environmental education, as part of one of the discourses.

In the relevant sections of this chapter, the literature is related to the research conducted by Wals and Van Weelie together with associates, on biodiversity as a

theme in environmental education (Dreyfus, Van Weelie and Wals, 2002; Wals, 2001; Wals and Van Weelie, 1997; Wals and Van Weelie, 1999).

The few relevant extant research studies on integrating art and environmental education are described, with an emphasis on methodology similar to the research of the dissertation.

2.2 Discourses on Integrating Art and Environmental Education

2.2.1 The identification of discourses

Two predominant discourses on integrating art and environmental education were identified by the researcher in an analysis of the literature. The first discourse is about active learning for environmental change using an integrated curriculum approach. This is represented in the work of Krug (1996; 1997) in the United States of America (USA) in which pupils go out into the natural environment and afterwards create art about what they have learnt. The second is about art as a personal response to the environment, such as “art-based environmental education” (Mantere, 1992; 1998; Van Boekel, 2006a), developed in Finland, which emphasises personal experiences in terms of aesthetics. These discourses are not mutually exclusive, but have been identified by the researcher for purposes of discussion.

2.2.2 Active learning for environmental change, using an integrated curriculum approach

2.2.2.1 Active learning

Active learning takes place when children construct meaning for themselves through activities in a lesson as well as from the concepts and knowledge introduced by the teacher (Janse van Rensburg and Lotz-Sisitka, 2000:18–19). Constructivist pedagogy

is used to create learning experiences relevant to the pupil¹ through placing emphasis on what the pupils already know and the process of actively constructing knowledge through new learning (Janse van Rensburg and Lotz-Sisitka, 2000:11; Shephardson, 2005:50). New learning will be influenced by prior knowledge and may result in conceptual change (ibid.).

Constructivist pedagogy has its roots in Piaget's work on the development of understanding through physically and mentally acting on objects (1970) and has been translated into discovery or activity-based learning methods. The theories of Vygotsky (1934/1986) have also influenced the constructivist framework with their emphasis on socio-cultural contexts (Janse van Rensburg and Lotz-Sisitka, 2000:12).

Efland (2004:754) traces the evolution of the cognitive revolution against behaviourist explanations of learning, including Gardner's ideas of symbolic computation and multiple intelligences (1993; 2004), theories of the embodied mind (Varela, Thompson and Rosch, 1991)² and constructivist views of learning. When pupils construct meaning in terms of their own knowledge seeking purposes, based on prior learning, they employ the social contexts and cultural tools of the domain in which they are working, such as that of the visual arts (Efland, 2004:753–754).

The personal experiences of the learners are significant in active learning. According to Neperud (1995b:9), post-modern discourse, with its focus on meaning in context, views knowledge as constructed and subjective experiences as legitimate sources of information. In art education about the environment, content in art thus reflects new experiences in context (1995b:10). Pupils use these new experiences and their prior knowledge to construct meaning for themselves through the activity of creating art on an environmental theme.

¹ Children in a formal learning context are referred to as 'pupils' throughout the dissertation, except if specifically in a recent or current South African context, in which they are called 'learners'. The participants in the non-formal programme researched in the dissertation are referred to as 'children'.

² The bringing together of outer experiences, such as educational stimuli, and inner personal knowledge and feelings is described in the theories of enactive cognitive scientists (Maturana and Varela, 1992; Varela, Thompson and Rosch, 1991) which have their roots in phenomenology, especially the writings of Merleau-Ponty (1962).

2.2.2.2 Integrated curriculum

Post-modernist approaches to teaching and learning in Western countries, such as the USA and UK, resulted in the development of curriculum frameworks from the 1970s on, which cross the bounds of disciplines. The integrated curriculum reflects a learner-centred approach, which aims to make learning more meaningful than what can be achieved through combining disciplines, on the basis that one's life experiences are not compartmentalised into subject areas (Beane, 1997; Brazee and Capelluti, 1995; Drake, 1998; Fogarty, 1991, 2002).

The integrated curriculum approach has its foundation in the progressive movement of the 1920s and 1930s, which emphasised learning that prepared pupils for participation in a democratic society (Beane, 1997:x; Drake, 1998:27). The approach was based on ideas of experiential learning and integrated knowledge such as those of Dewey (1938). In the UK, after the Second World War, shortages of teaching resources led to the development of thematic instruction which integrated the disciplines using the local environment as a resource (Charbonneau and Reider, 1995:4).

Forms of integration include interdisciplinary work, where two or more subjects are taught while dealing with a theme or topic, as well as integrative or transdisciplinary work, where the curriculum is formed out of concerns such as environmental or community issues, with the focus on the pupils' viewpoints. Integration is often associated with constructivist learning theories as pupils inquire into themes or topics and relate new information to prior knowledge (Parsons, 2004:782), as well as with active forms of learning (Charbonneau and Reider, 1995:xii).

Interdisciplinary work integrates themes, concepts and/or topics between disciplines through the shared goals of promoting skills and knowledge common to the subjects involved. Through integration, learning is enhanced through enrichment from more than one discipline (Drake, 1998; Fogarty, 1991, 2002). Transdisciplinary work draws on the disciplines needed to study the issue (Drake, 1995; Beane, 1997; Brazee and Capelluti, 1995; Fogarty, 1991; 2002). In both forms of integration, environmental issues are often the themes studied, as they incorporate several disciplines and are real

life issues (Beane, 1997:1; Barab and Landa, 1997:52–54; Charbonneau and Reider, 1995:150; Drake, 1995:25).

Beane (1997:1–4) emphasises that integration through a theme could become simply a rearrangement of lesson schedules, instead of promoting integration in several dimensions. He writes about four major themes of curriculum integration theory (1997:4–9). Firstly he looks at integration of experiences through reflection, where what has been experienced becomes part of the learner and is carried forward into new experiences. Secondly, he discusses social integration, where the curriculum promotes common values. Thirdly he deals with integration of knowledge through contextualised learning not restricted to subject compartments and through relating knowledge to real life issues. Finally he examines integration as a curriculum design, organised around issues of personal and social importance, as well as around integrating knowledge through learning experiences.

In South Africa, an integrated curriculum was promoted in the outcome-based Curriculum 2005 (C2005) (Department of Education, 1997a; 1997b; 1997c). The streamlined Revised National Curriculum Statement (RNCS) published by the Department of Education in 2002 reversed much of the emphasis on integration by removing the phase and programme organisers, separating history and geography, and dividing the disciplines of Arts and Culture into separate Learning Outcomes, but it nonetheless maintained that “[t]he principle of integrated learning is integral to outcomes-based education. Integration ensures that learners experience the Learning Areas as linked and related,” and that “learners should not deal with assessment standards in isolation. Links must be made within and across learning outcomes and Learning Areas. The achievement of an optimal relationship between integration across learning areas and conceptual progression from grade to grade are central to this curriculum” (Department of Education 2002d:13). Section 2.2.2.4 describes the RNCS in more detail, with reference to environmental education.

Integrating visual arts into the curriculum has been described as learning about other curricula subjects “through the arts” (Bamford, 2006:70, 139; Goldberg, 2006:4–5, 27–29), involving practical art for expression of the understanding of subject matter (Goldberg, 2006:27; Krug and Cohen-Evron, 2000:267–271). Goldberg distinguishes

this from learning “with the arts” (2006:26) using existing artworks to enrich learning in the different subject areas.

Brewer (2002:33–34) reports that only two per cent of the 479 written documents traced by him on integrating visual arts into curriculum are research related, while 82 per cent are programme reports and 16 per cent are theoretical writings. A later literature review on the integration of the arts into the curriculum, particularly but not exclusively in the USA (Burnaford *et al.*, 2007), describes large-scale research and meta-analyses (nine additional publications since 2002) supporting academic gains such as higher test scores and non-academic gains such as personality development (2007:30–45).

There are also eight discrete small scale studies that they describe, all since 2002 (2007:46–48), with findings including the benefits of arts integration for learning (test scores) and the relationship between visual and verbal literacies. Of particular interest to the methodology of this dissertation is a study by Andrzejczak, Trainin and Poldberg (2005), where the creation of visual images about nature facilitated spoken and written description afterwards.

A research study based on interviews, focus group sessions and written narratives of participants of the Chicago Arts Partnership in Education (CAPE), an extensive arts integration programme in schools, resulted in a publication on the rationale, methods and evaluation of arts integration (Burnaford, Aprill and Weiss, 2001). Participants in the study included teachers, principals, students, parents and artists. The authors describe how the integration of the arts into the curriculum involves moving beyond false dichotomies in teaching and learning, such as between the intellectual and sensory, between content, skills and concepts, between thoughts and feelings, in both received knowledge and personal expression.¹ Arts integration enables the bridging of dichotomies through creativity in aesthetic, sensory form (2001: xli–xliv).

The findings of Burnaford, Aprill and Weiss from the programme include pupils participating actively using their minds as well as their hands (2001:5). The arts make learning tangible, as they give sensory form to cognition, resulting in learners

¹ Parsons (2004:784) comments that the literature makes no mention of psychological issues in art education such as the integration of sensory, social and emotional experiences.

“recognising when they are engaged in meaningful learning” (2001:10) and developing their own understandings of the world (ibid:19). Thoughts are infused with feelings as the pupil expresses them in material form (2001:18). Working with art in an integrated curriculum helps learners to think metaphorically, enabling them to discover new relationships. It also enables authentic and original intellectual work as they construct meaning using visual language (2001:17). Reflection on the artwork consolidates the learning and adds to its meaning (2001:134). According to the authors, arts integration enriches both the subject being studied and art education through “an elegant fit” (2001:9).

The use of creativity and the imagination are also considered to be features of integrating visual arts into curriculum. Bamford reports that creativity and imagination can be nurtured through integrated arts (2006:128–129). Engaging the imagination is considered to be a teaching method for a stimulating and child-centred approach to learning (2006:130).

Parsons (2004:775–778) emphasises that visual art, when integrated into the curriculum, enables the study of complex issues and themes of contemporary society including the environment, through the pupils’ acquisition of knowledge and personal engagement, as they actively construct meaning (ibid:782). As visual art has conceptual content (a substantive issue, theme or topic), the depiction of understanding by the pupils in the creation of the artwork is central, along with aesthetic considerations (2004:787).

2.2.2.3 Social responsibility towards ecology in the USA: theory, practice and assertions

The integration of art and environmental education in teaching and learning was developed academically in the USA in the 1990s. Post-modern discourse in art education on social responsibility, the community, environmental concerns and interdisciplinary curricula resulted in the use of art for environmental change through active learning (Krug, 2002). This contrasted with the modernist pursuit of art as aesthetic expression for its own sake, where its importance lay in the formal elements of line, colour and form and their relationship (Parsons, 2004:786).

Ecology in nature (Krug, 1996; 1997) and environmental design (Neperud, 1995a) became the main foci for the integration of art and environmental education, with environmental design including an ecological orientation as an aim for design education, promoting the understanding of the interrelationship between the built environment and nature (Neperud, 1995a:235–236). This included the valuing of biodiversity (*ibid.*).¹ The use of recycled materials in art was also given an ecological rationale (Lankford, 1997; Taylor, 1997; Elliot and Bartley, 1998).

Krug (1997; 2002) developed concepts at the nexus of art and environmental education for teaching primary school children about art and ecology when looking at the artworks of professional artists. These concepts comprise location (bioregion, place), change (transformations such as degradation), time (its relationship to nature) and materials (their literal and metaphoric meanings). Concepts about human relationships to the environment (Heimlich, 1992) became philosophical underpinnings of the endeavour of integrating art and environmental education (Lankford, 1997; Krug, 2002). These comprise dominion (control), stewardship (care and protection), and union (interdependency and sustainability). The concept of interdependence received particular attention (Blandy, Congdon, and Krug, 1998; Krug, 1997; 2002; Ulbrich, 1998; and later Rosenthal, 2003). The ideas of place and community in art education expanded to include ecology and biodiversity (Blandy and Cowan, 1997:40; Blandy and Hoffman, 1993). Blandy and Cowan write that a sense of place is nurtured in the pupils when they learn about a bioregion, including the plants and animals, followed by its expression in art (1997:41).²

An active learning and inquiry framework was developed in relation to the integration of art and ecology or design education about the environment. The cycle was comprised of direct experience, observation, reflection, critical thinking and collaborative action (Birt, Krug and Sheridan, 1997:9). In this cycle, art forms part of

¹ Dreyfus, Wals and Van Weelie describe biodiversity as an ill-defined concept which is context dependent, as well as being inclusive, open to interpretation and value-laden (1999:159). This enables the pupils to construct their own meanings and values, based on prior knowledge and critically assess the different meanings and values (1999:160). Valuing biodiversity is the last of six stepping stones for contextualising biodiversity (Van Weelie and Wals, 2002:1148).

² The context dependence and personal interpretation implicit in the ill-defined concept of biodiversity (Dreyfus, Wals and Van Weelie, 1999:160) facilitated its inclusion in the concept of place and community (of species) in art education.

the reflective stage (ibid.) and can also be part of the action stage when art is made for the environmental messages it gives the community (Elliot and Bartley, 1998:54; Krug, 1997; Sheridan, 1996). Interdisciplinary or transdisciplinary frameworks were considered suitable for integrating art and ecology because of the complexity of environmental issues (Krug, 1996; 2002; Rosenthal, 2003).

Teachers who use an active learning framework and an integrated curriculum comment on the nexus between art and environmental education about ecology. Sheridan (1996; 1997), in reporting on a community project at Pickering Elementary School, writes how imagination, affective response, consolidation of sensory experiences and reflection during art making are part of the process of knowing about the environment.¹ Kraft, reporting on an art project on ecology and biodiversity organised by the Yellowstone National Park, describes how the arts help to achieve integration of "head, heart and hands" (Cowan, 1996:2).² The process involved translating what participants had learned and felt into art through their imagination (ibid.).

Inwood (2003:15) writes that art and ecology in an interdisciplinary framework involve the reflective and affective capacities of art making to enhance ecological understanding. She points out that ecological studies through art also increase pupils' understanding about themselves and the world, a goal of art education. Construction of knowledge and exercising powers of observation are common to both disciplines and help to forge connections between the pupils and the environment (2003:17). Art enables pupils to express their own interpretation of environmental issues (2003:18).

¹ The project at Pickering Elementary School became a flag-ship project for elementary and teacher education about art and ecology in an interdisciplinary framework. The pupils experienced wetlands and made tiles, based on their observations, for a wall in the wetland area, as community action (Birt, Krug and Sheridan, 1997; Neperud, 1997; Sheridan, 1996; 1997).

² Pupils from schools across America expressed what they had learnt through art in the context of the fragility of the larger ecosystem (Blandy and Cowan, 1997; Cowan, 1996). The six stepping stones for contextualising biodiversity developed by Van Weelie and Wals consist of the following: determining pedagogical perspectives and translating them into learning goals; selecting themes and contexts for the learning goals; analysing the meanings of biodiversity appropriate to the resources used; setting concrete learning objectives; attaching specific meanings to the concept of biodiversity in context; designing activities to promote awareness of values about biodiversity (Van Weelie and Wals, 2002:148).

Descriptions of programmes about river ecology in an interdisciplinary framework emphasise different ways of knowing through art and sensory experience (Holmes, 2002; Morin, Skinner and Collman, 1997; 2004) as well as encourage personal expression and greater awareness of the seen environment (Anderson, 2000:13–14; Holmes, 2002). Ecological responsibility is once again an educational aim.

Although no direct action is taken in some of the programmes, the pupils engage in an active process of learning with the educational aim of effecting change in their understanding of the environment and their possible future actions.

2.2.2.4 Education for the environment in South Africa: integrated curriculum in policy documents and curriculum guides

At the same time as the integration of art and ecology in education was being developed in a framework of social responsibility in the USA, the process towards a new curriculum had begun with the advent of democracy in South Africa.

The 1995 *White Paper on Education and Training* included an emphasis on environmental education as “an interdisciplinary, integrated and active approach to learning” to create “environmentally literate and active citizens” (Department of Education / Department of Labour, 1995:18). In 1997, the environment was defined as a phase organisec across the curriculum (including the Arts and Culture Learning Area) in the first version of C2005 which promoted integration as a key feature (Department of Education, 1997a; 1997b; 1997c).

A discussion document was written about integration in outcomes-based education to achieve the development of action-based competencies and environmental understandings (Janse van Rensburg and Lotz, 1998). The document suggests that the nexus between environmental education and the Arts and Culture Learning Area is that of the influence of changing cultures on the environment, including issues and risks. The authors also recommend using the arts in interactive ways to build competence in action as well as to explore concepts (1998:32).

O'Donoghue (2001) developed a model of active environmental learning in outcomes-based education, which included enquiry encounters, sharing information, taking action, reporting and critical reflection. In this model, projects are undertaken in local contexts for environmental change. His suggestion for the nexus between the arts and culture learning area and environmental education is the use of the "cultural capital of critical, creative, problem solving" (2001:11).

The outcomes-based framework for the streamlined Revised National Curriculum Statement (RNCS) of 2002 (Department of Education, 2002a) promotes a learner-centred, resource-based, contextually sensitive education founded, on constructivist educational theory, where learners acquire not only knowledge but also skills and values, by means of active learning.¹ The curriculum is underpinned by the four values of social justice, human rights, inclusivity and a healthy environment (in the sense of being healthy for people), taken from the country's Constitution (Republic of South Africa, 1996). These four values and the relationships between them weave through the Learning Outcomes (Department of Education, 2002a). The curriculum aims for integration among Learning Areas through Learning Outcomes and Assessment Standards based on interrelated knowledge, skills and values for a democratic society.

Research from two pilot projects, the Learning for Sustainability case study (Janse van Rensburg and Lotz-Sisitka, 2000) and the National Environmental Education Programme (NEEP) for General Education and Training (GET) (Lotz-Sisitka and Raven, 2001), helped shape the environmental Learning Outcomes and Assessment Standards of the new curriculum, including those of the Arts and Culture Learning Area (Janse van Rensburg, 2001).

Findings based on portfolios of work from schools in the NEEP-GET pilot project showed that the artworks expressed an appreciative or critical interpretation of surroundings. The artworks also explained ways in which cultural communities have

¹The participants in the research described in this dissertation theoretically had Curriculum 2005 underpinning their formal schooling for four and a half years, with the Grade 4 and Grade 7 children experiencing six months of the RNCS. However, it is questionable to what extent the curriculum was applied correctly in the classroom. The non-formal programme researched in the dissertation was not bound by the RNCS.

related to the environment over time and how visual art skills have been used to communicate the findings of an inquiry into environmental issues through models, posters and items from waste (Lotz-Sisitka and Raven, 2001:77). These findings for the Arts and Culture Learning Area were included as Assessment Standards in the curriculum, together with additional Assessment Standards for critically analysing the impact of present-day culture on the environment (Janse van Rensburg, 2001). Also included as Standards were the use of found materials (encompassing natural materials), the valuing of natural and cultural heritage, using art for reflection and cultivating the symbolic language of art (including about the environment) as well as having due concern for the environment when making art (Department of Education, 2002b).

A guide for the development of learning programmes in Arts and Culture suggests generating topics from the environment, including the natural environment, and that environmental responsibility is encouraged (Department of Education, 2003:37). The guide also suggests that many opportunities for imaginative work are created (ibid.). In a publication dedicated to enabling an environmental focus in Arts and Culture, the links between the underpinning value of a healthy environment and the Learning Outcomes and Assessment Standards of the Arts and Culture learning area are made explicit, with explanations and examples (Department of Education / NEEP-GET, 2004).

The content of curriculum guides for teachers, produced as a result of work done by academics in environmental education and related fields, has an explicit active learning framework in local contexts, often with an integrated curriculum approach. These include the *We Care* series of booklets (WE CARE primary, 1993), with a second phase of the project (Leisegang and Lotz, 1995; Lotz and Sumner, 1995; Lotz, 1996b; 1996c) developed through teacher participation (Lotz, 1995; 1996a).

The first phase was based primarily on concepts, such as conservation, place, change, adaptation and diversity and the second phase mainly on topics or issues (Lotz, 1996a:192) such as the right choices, recycling and family. Art is an integral part of active environmental learning for a number of activities in most of the books and includes a variety of art projects (creating papier maché items, collage, drawing,

posters and many more). Art contributes to environmental knowledge, attitudes and feelings both through observation and imaginative activities. The emphasis is therefore not on taking action directly for immediate environmental change, but on active learning through allowing learners to construct knowledge through activities.

Schreuder and Reddy led a project to redevelop the *We Care* series¹. This project resulted in environmental support material for Grades 4 to 6 Natural Science teachers, with cross-curricular links in the activities for an integrated approach (Stander and Van Aarde, 2005). The guide includes the components of finding out information, direct encounters and taking action in an active learning framework as described by O'Donogue (2001) to align it with the RNCS. Some of the units have art with an environmental message displayed as a way of taking action. Art is a part of many units. The nexus between art and environmental education in these materials is primarily observing and recording (such as observation drawing) as well as constructing and applying knowledge (such as the creation of posters, models and collages of cut outs) because of the Natural Science orientation. Occasionally the art projects emphasize the use of imagination.

A science curriculum guide project specifically on biodiversity for Grades 7 to 9 was developed² (Schreuder, 2000). This was followed by an updated version (Environmental Education Programme, University of Stellenbosch, 2005). The guide contains the active learning framework, including taking action (2005:xv). Both versions have links to other Learning Areas for integrated activities in environmental education. The guide has sections explaining the definition of biodiversity, its importance, its threats and protection as well as the concept of interdependence. There are art activities throughout, with art again being used for the constructing and applying of knowledge (such as in posters) and only sometimes emphasising imagination.³

¹ Schreuder authored the first South African version of *We Care!* (1988). He also conducted research into pupils' orientation to the natural environment and conservation (1990).

² The topic of biodiversity forms part of the core knowledge and concepts of the Natural Sciences Learning Area (Department of Education, 2002c:62–65).

³ Four pedagogical arguments for learning about biodiversity became evident in the study conducted by Van Weelie and Wals (2002:1–150): emotional, ecological, ethical and political arguments. The science guide concentrates on the ecological argument, involving understanding of relationships, as well as the ethical argument, dealing with values.

Several guides use an active learning framework for environmental change, with environmental education integrated into the curriculum in one or several Learning Areas for a topic or activity (Ashwell, 2003; 2004; Epstein, Brown and Mitchell, 2006; BirdLife South Africa, 2000). Where art and environmental education are linked in guides on plants (Ashwell, 2000; 2001) there are examples of art for conveying factual information (such as sketches, paintings and posters). Occasionally the art emphasises the use of imagination to convey a personal response.

Janse van Rensburg translated her work on curriculum development (Janse van Rensburg, 2001) into practical guides, including those about using national parks as an educational resource (Janse van Rensburg, 2003a c), incorporating a version of O'Donoghue's active learning framework (Janse van Rensburg, 2003a:26). Janse van Rensburg foregrounds the integration of environmental education into different Learning Areas of the curriculum. One volume is dedicated to the biodiversity of the Table Mountain National Park, formerly the Cape Peninsula National Park (Janse van Rensburg, 2003c).¹ She also points out that biodiversity can be an emotive subject for the arts (Janse van Rensburg, 2003c:7). When discussing the role of National Parks, she gives their beauty as one of the reasons why nature refreshes the human spirit (Janse van Rensburg, 2003b:46).²

2.2.3 Creating art as a personal response to the environment

2.2.3.1 The nurturing of pro-environmental attitudes, sensitivity and an aesthetic appreciation of nature in environmental education.

The early environmental education conferences of Belgrade in 1975 (UNESCO/UNEP, 1976) and Tbilisi in 1977 (UNESCO/UNEP, 1978) included education for environmental sensitivity, awareness and attitudes in their objectives. The Tbilisi Declaration developed five levels of objectives for education about the environment (especially in relation to problems): awareness, including sensitivity to

¹ The author links art and environmental education with regard to the RNCS, as outlined in the previous section of this chapter, and also describes art and environmental education with regards to the RNCS in a guide about classroom practice for a healthy environment (Rosenberg, 2004).

² The pedagogical arguments (Van Weele and Wals, 2002:1-150) for learning about biodiversity (emotional, ecological, ethical and political arguments) are reflected in these Assessment Standards and the author's statement about the benefit of the beauty in National Parks.

the environment; knowledge; attitudes, including acquiring values and feelings of concern; skills for action; and participation for action (1978:3).

Subsequent writing and early research in environmental education focused on the relationships between knowledge, attitudes and behaviour as well as other allied variables such as sensitivity. The factors to do with attitudes, sensitivity and other personal variables were identified as significant factors for behaviour change (Sia, Hungerford and Tomera, 1986; Hines, Hungerford and Tomera, 1987; Hungerford, Peyton and Wilke, 1980; Hungerford and Volk, 1990). Zimmerman (1996), in his review of 15 years of research (1979–1993) on the relationship between knowledge and affect, concludes that there is reciprocity, but the dynamics need to be explored further, including their effect on behaviour.

The relationship of the affective domain to environmental education and the nurturing of values/attitudes was described by Iozzi in his review of the research of the preceding 20 years, with recommendations on how to teach pro-environmental attitudes and values (Iozzi, 1989a; 1989b). Recommendations include using the arts for this purpose (Iozzi, 1989b:6–7). Emmons (1995:65–66) emphasises that attitudes and sensitivity (grouped together by her), concepts and actions are not sequential, but interactive. Willers and Van Staden describe the synergistic relationship between cognition, the affective dimension and behaviour (1998:31–32).

The following review of the literature about the affective dimension in environmental education is grouped according to the topics of sensitivity, attitudes and aesthetics.

Early research into **sensitivity** to the natural environment focused on identifying factors leading to this attribute being developed in environmental educators (Peterson and Hungerford, 1981) or people involved in environmental action as members of environmental organisations (Tanner, 1980).¹ Peterson later reports that her research was motivated by the discovery that participants of environmental education programmes without this attribute did not move through the five levels of objectives set out in the Tbilisi Declaration (Peterson, 2005:295).

¹ The validity of significant life experience research has been hotly contested. See *Environmental Education Research*, vol.5 (4), 1999; Chawla 2001.

Sensitivity was defined by Peterson as "empathy" and qualified as including concern and appreciation (Chawla, 1998:12). According to Chawla, empathy is a problematic term as it implies resonance with the environment's assumed feelings or projection of feelings onto the environment (ibid.). However, there is evidence that children do perceive the world as animate (1998:18). Subsequent research used the term 'sensitivity to the environment' as a predisposition to having the interest to learn more, feeling concern and acting to conserve based on formative experiences (1998:19).

Later research bears out the finding of the early work that experiential, cognitive and affective factors were significant in forming the attribute of environmental sensitivity. These factors include outdoor experiences, role models such as teachers (who are also sources of knowledge), familial influence, knowledge through books and loss of a natural area frequented in childhood. (Chawla, 1998; Sward and Marcinkowski, 2005). Palmer (1993:27) adds the category of disasters or general negative issues from the descriptions of her respondents, indicating a shift of perceptions in the intervening decade. Although the concept has not been well defined, the importance of sensitivity to the natural environment has resulted in its inclusion in environmental literacy assessments and evaluation studies, but practical indications as to how to include sensitivity experiences are lacking (Sward and Marcinkowski, 2005:307).

The concept of **attitudes** to the environment is closely linked to the concept of sensitivity to the environment. Attitudes can include concern (UNESCO/UNEP, 1978; Rickinson, 2001:247). However, in Hungerford and Volk's study (1990), sensitivity (according to Peterson's definition, which includes concern) and attitudes (toward pollution, technology and economics) are treated separately but both are seen as entry-level variables for effecting pro-environmental behaviour (1990:316, 317).

Rickinson's review of research into learners and learning in environmental education from 1993 to 1999 has resulted in evidence being grouped into nodes that reflect the significance of environmental sensitivity, attitudes and concern for environmental education (Rickinson, 2001). Three established nodes of evidence are, firstly, pupils' environmental knowledge, secondly, pupils' environmental attitudes and behaviours and thirdly, pupils' environmental learning outcomes (knowledge, attitudes/sensitivity and behaviour). The section on environmental attitudes and behaviours also includes

concerns in a separate section and, to a lesser extent, sensitivity. Of the three emerging nodes, one is pupils' perceptions of nature and of the word 'environment', including attitudes/concerns (2001:219).¹ Research into concerns deals mainly with the types of issues about which learners are concerned. Research into attitudes aims to define the extent to which pupils are concerned and the extent to which they are willing to act (2001:247).²

The section on evidence about environmental learning outcomes (knowledge, attitudes/sensitivity and behaviour) examines evaluations of school-based teaching strategies and out-of-school programmes (2001:262). Key findings include that certain aspects of programmes facilitate positive outcomes, for example duration, location (outdoors programmes being the most effective) as well as preparation and follow up for all three learning outcomes (2001:270–271). Rickinson also cites an exploratory study by Emmons (1997), which identifies role modelling, direct experience, understanding of concepts and recreational relationships for positive attitudes (1997: 339, 343).

In research on learners' perceptions of 'nature' and of 'environment' (including attitudes/concerns) there is a strong emphasis on the voice of the pupil. The key findings include that pupils perceive 'nature' as a natural/non-human entity, a place for recreation, threatening as well as under threat; 'environment' is perceived as including the human entity, known locales and concerns/problems to be managed (Rickinson, 2001:277).

Gayford's study shows that secondary science teachers thought that the appreciation of the variety of living species was lost when teaching about biodiversity to pupils, except when taught with imagination to eight- to twelve-year olds (2000:35). The teachers suggested that a range of methodological approaches, such as discussions and the use of drama could foster positive values and attitudes (2000:355, 357–8).

¹ Rickinson describes the emerging research as emphasising the pupils as active agents (2001:223). The term 'perceptions' in this context is used in opposition to objective knowledge. It includes the personal response of the learner.

² Attitudes to the environment have been defined in several texts as containing cognitive, affective and conative (behavioural) dimensions (Schreuder, 1990:32–33; Willers and Van Staden, 1998:29).

Aesthetics in connection with environmental education has been defined and used in various ways. Adams (1991:19) defines 'aesthetic' as 'pertaining to the senses'.¹ She adds that the word has become linked with 'beautiful', but that she uses it in its original sense. Mortari examines the value of aesthetic thinking, by which she means the capacity for expressing an appreciation of nature (Mortari, 2003:117). Palmer uses the term 'aesthetic' to refer to qualitative experiences in and from the environment that contribute to the appreciation of the wonder or beauty of nature (Palmer, 1998:267-269).

The above authors regard aesthetic experience as being part of the cultivation of pro-environmental attitudes and sensitivity to the environment. Mortari asserts that aesthetic thinking results in an acknowledgement of the intrinsic value of nature, safeguarding it from an instrumental perspective (Mortari, 2003:117). This kind of thinking can be achieved through outdoor experiences with sensorial contact and nature immersion exercises, with the theoretical basis of the phenomenological tradition, which regards all learning as embodied. (2003:118). Mortari also emphasises the necessity of reflection on aesthetic experiences in order to add meaning to them.

Palmer developed a model for teaching and learning in environmental education, in which the aesthetic element was one of the three key elements in an approach that integrates three aspects of environmental education: education about the environment as the empirical aspect; education for the environment as the ethical aspect; and education in and from the environment as the aesthetic aspect (Palmer, 1998:272). Experience, concern and action were also integrated into the model, as well as knowledge, concepts, skills and attitudes, all underpinned by previous formative influences. Palmer questions whether education "for" the environment has received too much emphasis, neglecting a more systematic education "about" the environment as well as "in" the environment, "that essential foundation for formative influences of the personal aesthetic kind" (1998:273). Environmental education's "highly value-laden content" incorporates multiple dimensions, including the aesthetic (1998:267).

¹ From the Greek 'aisthesis' or 'aisthetikos', meaning perceptible by the senses, 'aisthethai', to perceive (Adams, 1991:19).

The four pedagogical arguments for learning about biodiversity which emerged during the study conducted by Van Weelie and Wals include an emotional argument for “(re)connecting with nature through discovery and sensitization, and experiencing biodiversity to create personal meaning” (2002:1 150). The three perspectives on biodiversity identified by Van Weelie and Wals that link to general environmental learning goals include the relationship between nature and the self, such as personal and emotional involvement and reflection on the role of humans in threats to species (ibid.).¹

2.2.3.2 Personal responses to a theme or topic in an art medium, achieved through the senses, imagination, metaphor/symbol and reflection.

Creating art provides children with the opportunity to express their personal thoughts and feelings, with the individuality of their artworks being the goal in an art programme of good quality (Hurwitz and Day, 2001:30). In art education, the affective and subjective response of the self to the world is valued (Adams, 1991:28). Art education helps learners recognise and appreciate what is personal and individual in their work (Eisner, 2002:44, 197).²

A personal response to a theme or topic when creating art is achieved through the senses, imagination, metaphor/symbol and reflection. Burton (2000) describes the development of children in these terms:

They discover new and more complex means to articulate the imaginative and objective interplay of affective experiences in their social worlds. In short, representation heralds a new layer of possibility in which meaning, originating in embodied experiences, becomes imaginatively structured and extended in symbolic forms. Importantly, this new possibility allows for the mentally constructed meanings that images express to become available to reflection and further imaginative interpretation (2000:338).

¹ The other two perspectives on biodiversity which are linked to general environmental learning goals are “ecology and society” and “the politics of nature” (Van Weelie and Wals, 2002:1 150).

² The researcher visited and recorded pictures made by learners at exhibitions at six venues in different cultural and socio-economic areas on the theme of water, part of the Cape Town Earth Festival held by City of Cape Town in November/December, 2003. The art was facilitated by the Frank Joubert Art Centre in partnership with Ithabathane Project and was created at participating schools as well as at the Centre, with learners from schools reflecting a range of backgrounds and learning abilities. A few of the best pictures from each lesson were shown, with work from several lessons displayed at each exhibition. In the vast majority of cases, artworks made in a particular lesson were very similar to each other, with the personal response of the learner not facilitated.

The growing child's environment is experienced through the senses, with concepts formed based on sensory experiences (Eisner, 2002:1–3; Efland, 2004:753). Cognitive theorists Lackoff and Johnson (1999), promulgators of the embodied mind approach, provide the foundation for Efland's theories. Nadaner (1999:198–200) argues for the integral role of imagery in thought, derived from visual sensory information, based on theories of Arnheim (1969), Neisser (1972) and Piaget (1971). These sensory experiences and their derived concepts are expressed in the creation of art through the imagination by means of available materials. In this way, the creation of art is a series of cognitive events of a qualitative nature based on the senses (Eisner, 2002:xii, 20–23). Ideas and the construction of meaning are stabilised in visual form through the art materials (Eisner, 2002:239). Through this process, aesthetic sensibility is developed, which enables pupils to respond aesthetically to the world (Eisner, 2002:5, 232; Hurwitz and Day, 2001:64).

The pupil's imagination plays a pivotal role in a personal response and the construction of meaning through art activities (Burton, 2000:330; Eisner, 2002:23; Greene, 1995:133). There are two levels of imagination: firstly, that of images in the mind (based on sensory experience and conceptual refinement of these experiences) and secondly, the rearrangement of mental images from previous experiences into new combinations created by the person (Efland, 2004:771; Eisner, 1998b:24–27). The latter level of imagination is the more commonly understood meaning in visual art (Efland, 2004:757; Eisner, 2002:4). In art, the valued use of the imagination is in the recreation of personal experiences and thoughts through mental images into sensory experience in an artwork (2002:4–5). Through imagination, thought experiments are given an opportunity for their creation (2002:4) and new possibilities are explored (Efland, 2004:757; Eisner, 2002:10; Greene, 1995:133), both cognitive endeavours (Efland, 2004; Eisner, 2002).

Efland (2004:771–772) argues for art education as imaginative cognition with the aim of cultivating the imagination through the creation of new ideas, often derived from sensory and bodily experiences. New ideas are developed through the imagination when images or symbols are combined to create metaphor and narrative, allowing individuals to formulate their personal responses to issues which affect them and society (Efland, 2004:757–8). Efland writes: "Deepening the wellspring of the

imagination and the role it can play in the creation of personal meaning and in the transmission of culture becomes the point and purpose for having the arts in education” (2004:769).

Visual images are expressed through metaphor and symbol in art. There are two levels of metaphor. Metaphor refers to the nature of visual images as cross domain mappings from the world of thought of the artist to that of the senses, where the mappings may refer to tangible objects (Efland, 2004:756). A metaphoric depiction is an image that refers to an object or action that it does not literally denote, in order to imply a resemblance. Metaphors can be created through mapping from one conceptual domain to another (Efland, 2004:772). A symbolic depiction is an image that represents or stands for something else, usually by convention or association, especially to represent something abstract (Eisner, 2002:21). As children develop, their sensory, affective and cognitive modes of responding to the arts interplay with increasing complexity for the structuring of symbols in visual art (Burton, 2000:335).

During the process of making the artwork, the pupil responds to the materials and the artwork in affective, imaginative and sensorial ways through reflection (Burton, 2000:334; Eisner, 2002:4). The pupil edits the artwork in response to what is being created, in order to represent intentions that develop during the process (Eisner, 2002:6-8). Both aesthetic and conceptual changes are made (ibid.). The pupil's reflection on the completed artwork, through speaking and writing about the work consolidates ideas and feelings, as well as facilitating their further development (Andrzejczak, Trainin and Poldberg, 2005).

2.2.3.3 Practice and assertions in Finland, UK, USA and SA

In Finland, an art orientated approach to environmental education was developed in the 1990s. Mantere uses the term “art-based environmental education” to refer to a methodology she has developed, which she asserts combines ecological consciousness with deeply felt personal experiences and a sense of aesthetic qualities.¹ There are two

¹Mantere's approach to “art-based environmental education” is reflected in the emotional pedagogical arguments and the “nature and self” perspective for learning about biodiversity (Van Weelie and Wals, 2002:1150).

types of occasions for such experiences: one when in nature and the other while doing the art (Mantere, 1992; 1998; Van Boekel, 2006a; 2006b).¹

According to Mantere (1992; 1998), the nexus of art and environmental education is this personal response to nature, as well as the cultivation of concepts, meanings and values about the environment through artistic activities, with positive aesthetic experiences being the basis for action. Enjoyment of creating contributes to this positive experience. Sensitivity to the environment is cultivated through aesthetic experiences when using appropriate materials. The use of imagination enables a visual portrayal of values and issues.

Mantere adds that creative imagination can clarify visions for the future through artistic activities that promote outlining the problems and imagining solutions. Art education can also contribute to environmental change through the pupils' public expression of their views through art, contrasting damaged and pristine natural areas (ibid.).

Mantere explains the way in which the nexus works in her methodology:

Experiences and observations of the environment are treated through mental images, tangible pictorial expression, and other artistic activity. It is active and often pleasant cognitive action and learning. However, art education must also develop the levels of reflection and conceptualisation, in order to round off the whole process of experiential learning (1992).

In the same vein, the Finnish art educationalist, Timo Jokela, developed didactic models comprising exercises to increase sensitivity to the environment in terms of what is experienced through the senses, such as visual or tactile sensations, or according to cognitive concepts, such as change, time and cause, either natural or human (Van Boekel, 2006a; 2006b).

A seminal early work from the UK (Adams and Ward, 1982) describes, within a theoretical framework concerned with the contribution of visual art to environmental education, a nationwide project where pupils draw the built environment *in situ* with

¹ Van Boekel's article was first published on the website <http://www.greenmuseum.org> (2006a) and then revised, refereed and annotated for the journal *The International Journal of the Arts in Society* (2006b) which the author sent to the researcher in its final published form.

annotated personal responses for nurturing subjective and sensory understanding. Emphasis is on the direct experience, affective response, personal interpretation, discriminatory skills and reflection that art can offer in order to cultivate attitudes and values about the environment, as well as critical appraisal. According to Adams and Ward (1982:85) both writing and drawing are symbolic representations, with drawing being a language to facilitate pupils' understanding of their experiences, both for themselves and to communicate this to others.

Another early seminal project in the UK on sensitisation to the environment through art education (Joicey, 1986) focused more on the development of observational art skills, using the environment as a resource, than on environmental education. However, the author emphasises the way in which observational art enables pupils' awareness, knowledge and understanding of details in the environment and gives time for their reflection on the subject as well as facilitates a personal response (1986:8).

In a later work, Adams (1991) includes other programmes and projects. She emphasises aesthetic and direct environmental experience, as well as experiential learning (generating, sharing, reflecting on and understanding experience). Experiential learning about the environment is facilitated through the visual-tactile language of art, which symbolises sensations in tangible form (1991:21) and synthesises what has been learnt (1991:27). Art, as a study that explores the relationship of self to the world, promotes a feeling response and empathy towards the environment (1991:28).

Along the same lines, the British educationalist, Peter Martin (1993), emphasises a personal response to the environment through the arts for environmental understanding. Feelings about the environment are expressed in a medium through "observation, identification, gathering information and reflection" (1993:24). In this way feelings are clarified and consolidated. A personal connection to the environment is made through the senses and emotions (ibid.).

Wenham (1994) followed Adams's line of thought on investigation through visual perception and communication of values and knowledge about visual quality, in order to promote the conservation of the environment. In addition, he advocated creative and

expressive art about the environment for the nurturing of personal experiences, feelings and learning processes of pupils (1994:75), including a personal response and empathy through art in nature made from natural found materials (1994:76).¹

Similarly, an approach developed by MacLellan (1995) in the UK combines drama and visual art. In this approach a creative story-line has art as the main or culminating activity in a multi-disciplinary programme on an environmental theme or topic designed to enable expression of personal feelings and understandings about nature.

Programmes in the USA have also focused on art for a personal response to the environment in addition to promoting active learning for environmental change. The programmes of the Acclimatisation Experiences Institute (Van Matre, 1979) and those of its later form as the Institute for Earth Education (Van Matre, 1990) place an emphasis on direct experience in the natural environment and sensory engagement for sensitisation while learning about ecological concepts. Art activities play a role in the process of encouraging empathy with the environment, especially in the earlier programmes' nature "discovery" and "immersion" experiences (Van Matre, 1979:165–197).

In the 1990s, the poet John Caddy conducted a programme at the Centre for Global Environmental Education at Hamline University, USA, for environmental education about ecological concepts through poetry and the visual arts.² Caddy expresses the value of direct experiences, affective personal responses and the interdisciplinary nature of environmental education for creating an "ecological consciousness" combining knowledge with a sense of wonder and beauty. Materials from nature are used in programme suggestions (Caddy, 2004).

A sense of wonder and beauty is also encouraged in the USA-based International River of Words programme, introduced in 1995, which uses poetry and the visual arts as tools for children to express what they feel about their river environments after

¹ Gurevitz's research with British children (2000) challenges the assumption that the arts can engage children's emotions more directly than scientific knowledge in environmental education. The author calls for further research to develop approaches to environmental education that can connect with children's environmental experiences.

² The programme has since moved to a website (Caddy, 2004).

direct learning experiences about the watersheds. The nexus of the arts and ecology is the cultivation of a sense of place through the connection forged with a personal and imaginative response, when back in the classroom (Michael, 2001; 2004). Engel (1991) writes about how the symbolic activity of visual arts and creative writing enables children to access direct aesthetic experience of nature, which is less available as they get older and to "expand and deepen aspects of the environment they learn about" (1991:45).

The programme researched for this dissertation had no clear discourse on a personal response to the environment in South Africa on which to build, only examples and suggestions from individuals. Some examples include using materials from nature to elicit personal responses from learners.

In the mid-80s an interest in the role of the arts in environmental education developed in the South Africa as seen in articles by Holderness, Motlhalo and McCullum (1986) and Hardy (1988). Clacherty (1986), referring to Adams and Ward (1982), emphasises the particular function of the arts to cultivate values and an affective response to the environment, actualised in a later project to sensitise pupils to the built environment through drawing (Clacherty and Clacherty, 1990). Cohen (1986) recommended direct experience of the environment in art education, including sensitising experience, documenting the environment and the creation of art in the environment to promote its transformation.

Opie's experiential art exercises have a visual-tactile (sensory) or imaginative approach which includes encouraging learners to sketch the natural and built environment, for the purposes of cultivating personal values and an affective response to the environment (1989; 1992; 1997). Materials include those from the natural environment. He constructed a theory about pupils' aesthetic responses to the natural environment (1990).¹ Consequent proposals for environmental education based on "earth love" (1992) coming under criticism from proponents of the active learning model for being a theoretically unsound blend of eclectic ideas which disregarded the participative principles of environmental education (O'Donoghue, 1994:44). Opie

¹ Opie defines "aesthetic response" as a personal appraisal response based on cognitive evaluations and affective preferences arising from perceptions (1990:xxiv).

later incorporated the approach of environmental education for action and exploration of environmental issues, as well as social and cultural aspects of the environment, into his theory (1997).

Many publications on environmental education about the natural environment include art activities primarily for their usefulness for cultivating personal responses through the senses, such as wonder (Roff, n.d.:9), expression of feelings and values (Wigley, 2000:17) and enjoyment (2000:26). Sketching is frequently used to encourage a focus on the natural environment. Natural materials are utilised in teaching, such as the much used sticky cards used as artists' palettes for collecting plant specimens according to concepts, colours or feelings.¹ In general, the art activities in the literature have no clear framework for their function.

2.3 Research

2.3.1 Published empirical studies

2.3.1.1 Availability

There is little empirical research on integrating art and environmental education. Two published research studies were located, one of which is in an academic journal. This contrasts with the availability of academic writing relating theory to practice that is not based on empirical research.²

2.3.1.2 Research article

The academic paper reports on research that explored the links between visual arts and environmental education during a teachers' in-service training programme at a residential environmental education centre in Cyprus (Savva, Trimis and Zachariou, 2004). The research was conducted by the three lecturers facilitating the programme. They used a case study methodology with qualitative data collected by means of observation, interviews and discussions, analysis of the twelve participants' diaries as

¹ The cards have strips of double-sided tape on which parts of plants can be placed.

² Many of these academic writings relating theory to practice were not easily accessible, even though published.

well as photographic and video material. According to the authors, the study was underpinned by the discourse of visual arts being the vehicle for sensitisation to the environment (referring to Joicey¹ as well as Engel, 1991) as well as concepts at the nexus of art and environmental education such as place, time, materials and change, referring to Krug (2002) as well as Elliot and Bartley (1998). The article examines the structure and organisation of the programme, the impact on participants and the potential for similar projects in schools.

Findings include the value of the combination of visual art and outdoor experiences for sensitising participants to the environment through personal emotional engagement, as well as the importance of the materials used as a stimulus for the artworks. The authors note the high quality of artworks produced, which they ascribe to the participants' exposure to the natural and cultural environment. The artworks were mainly expressions of sensitisation to the environment and exploration of materials.

The above study is similar to the research of this dissertation in its methodology and qualitative data sources (replacing diaries with written work) with the programme's facilitators doing the research. Personal responses and feelings (sensitisation), metaphoric/symbolic expression, the use of imagination as well as reflection are common to both the published study and that of the dissertation. However, the current research places more emphasis on environmental knowledge and its expression through the use of materials.

2.3.1.3 Research report for teachers

A report in an environmental journal for teachers describes research for a Master's dissertation on lessons in natural science with American high school pupils about river ecology, using visual arts and music activities (Holmes, 2002). Although not explicitly stated in the report (aimed at teachers), the researcher used qualitative methodology for the research, examining how the introduction of arts into environmental lessons

¹ Savva, Trimis and Zachariou (2004) refer to the following: Joicey B. (1995). *Eye on the environment*. New York: World Wildlife Fund. The reference could not be traced, in contrast to the Joicey publication of similar title referenced in this dissertation.

affected high school pupils' learning. Data sources included interviews with the pupils as well as their journal entries. Holmes (2002:24) refers to writings about the value of the arts for cognitive development (Fowler, 1996; Eisner¹; Gardner, 1999). Findings include increased understanding of the environmental content of the lessons and an emotional connection to it, as reported by the pupils (Holmes, 2002:28).

In her lessons, Holmes used the arts in the initial stages to foster inquiry based learning through observation and knowledge based activities, with some sensitisation built into the exercises. This contrasts with the programme researched for this dissertation, where visual arts were included in the later stages of the session for expression of concepts and personal responses. As with Holmes's research, this study examines the pupils' understanding and feelings.

2.3.1.4 Research on the integration of art and environmental education as part of larger projects

A report on a colloquium of teachers on art and environmental education was compiled by a faculty member during the proceedings (Neperud, 1997). The report was based on the written and oral comments of participants (including responses to questionnaires). The aim was to explore the teachers' understanding of education about art and ecology. Many were interested in the interdisciplinary aspect.

Research on the integration of art and environmental education during the projects of the Learning for Sustainability case study (Janse van Rensburg and Lotz-Sisitka, 2000) as well as the National Environmental Education Programme for General Education and Training (Lotz-Sisitka and Raven, 2001) contributed to the RNCS as described earlier in this chapter.

An international research review on the arts in education lists an environmental project in Brazil (Bamford, 2006:99, 177), but the website named for further details is not available and the author could give no further details in correspondence (Bamford, 2008).

¹ Holmes (2002) incorrectly referenced the book *The kind of schools we need* by Eisner (1998b) as being published in 1991, in contrast to the Joicey publication of similar name referenced in this dissertation.

2.3.1.5 Use of visual art as a research instrument for children's responses to the environment

Several research papers discuss the use of drawings, paintings or collages in combination with interviews as a means of ascertaining children's perceptions about the environment (Alerby, 2000; Barraza, 1999; Bonnett and Williams, 1998; Bowker, 2007; Fleer, 2002; Gurevitz, 2000; Palmberg and Kuru, 2000; Owens, 2005; Van Staden, 2006). One study includes written explanations from the participants instead of responses during interviews (Shephardson, 2005). The purpose of the art activity discussed in these papers was to create a visual text for analysis and/or discussion as part of the research design only and not as a pedagogical tool for environmental education. In the research of this dissertation, the art activity is an integral part of the environmental education programme and used later as data. There are, however, some similarities in the methodology of these research studies to the research of the dissertation, such as a qualitative approach and using interviews and writing in conjunction with the artworks, as well as using visual and textual analysis.

In Alerby's qualitative study of pupils' thoughts about the environment (2000), the participants had a choice of media (paper and pencils, crayons or watercolours) for responding to the word 'environment'. Alerby termed the resulting pictures 'drawings', which were analysed in a repeated and thorough manner, individually and comparatively. Children's comments about their artwork were analysed in conjunction with the artworks. Shephardson's qualitative study (2005) examined pupils' responses to the question: 'What is an environment?' He used the methodology of White and Gunstone (1992:103) in which children draw in response to a request from a teacher and write an explanation of their drawings.

Studies which use interviews with participants to elicit explanations of their drawings include Barraza's research (1999) on children's environmental perceptions and future concerns, Bowker's research (2007) on children's perceptions and learning about tropical rainforests, as well as Owens's study on children's environmental values (2005). Barraza repeatedly checked criteria for analysing the content of the artworks for reliability and validity in interpretation and analysis, and had the drawings

interpreted by another researcher. Barraza's findings include that children "put together their knowledge and visual perception...vital for the development of the higher thinking processes and mental representations" (1999:61). One of Owens's findings is the significance of direct experience and teaching outdoors for the formation of positive environmental values (2005:323).

Like Barraza's study, Fleer (2002) used drawings to ascertain children's visions of their future environments. Some children wrote diary entries instead. The drawing and writing were used as a catalyst for discussion with groups of three to four children. Analysis comprised of visual and textual analysis into categories. In Van Staden's study of South African children's concepts of their future environment, the children drew or wrote what they thought their environment would look like when they are grandparents. The study followed this up with interviews in which the children explained their drawings or writings. Their issues and concerns included social issues as well as pollution and caring for the environment when taught about this in a school programme (2006:51–52).

Bowker's quantitative study (2007) used an art teacher paired with an educator at the Eden Project, Cornwall, to assess children's pre- and post-workshop drawings of a topical rainforest according to a predetermined scoring system. This included recording the number of themes in each drawing. One of the themes identified was biodiversity in terms of trees and plants (2007:84). The extent and depth of understanding of this theme increased significantly through the intervention of a guided activity in the rainforest in the Eden Project dome (2007:88). Bowker notes that affective learning is also expressed in these drawings in addition to knowledge and understanding (2007:93–94).

Bonnett and Williams (1998) asked children to explain their drawings in their study of the children's perceptions of nature. Gurevitz, in order to understand children's experiences of the environment (2000), asked participants to represent this in a holiday collage, using pictures, photos and drawings, analysed in conjunction with the children's explanations (2006).

2.3.2 Unpublished research studies

An Internet search revealed an abstract of a Master's dissertation about integrating art, mathematics and environmental education in the classroom (Davis, 2005), further details of which were obtained from the student (Davis, 2007). Davis, using an action-research methodology, found that the lessons were not a success. Difficulties included integrating two subjects and an environmental approach, too laborious an art project and lack of appropriateness of the lesson content to the grade level. Davis pointed out that research into three-way integration is only in the early stages (2005). The programme at Kirstenbosch also integrates two learning areas (art and aspects of natural science) with an environmental approach.

A research plan of an intended doctoral study was made available to the researcher, comprising the relevance, focus and methodology of an ethnographically informed inquiry into the epistemological foundations of the Finnish art-based environmental education programme (Van Boeckel, 2006c). The research will be an extension of an investigation reported on earlier (Van Boeckel, 2006a; 2006b). Although referring to practice, the methodology as described is not empirical as in the research of this dissertation.

2.4 Conclusion

There are two identifiable academic discourses regarding the integration of art and environmental education. The discourse of active learning for environmental change uses an integrated curriculum framework that includes visual art. Art making for a personal response to the environment has as its basis the importance of nurturing pro-environmental attitudes, sensitivity and an aesthetic response to the environment. In both discourses, the pupils depict understanding as they construct knowledge, including concepts as well as feelings.

The discourses have theories that are associated with either art or environmental education as their basis. These theories involve active ways of learning with the construction of knowledge and understanding through sensory experience, concepts

and facts, personal response and feelings, metaphoric and symbolic expression, the use of imagination and reflection, as well as the use of materials.

However, there has been very little research on how art and environmental education are integrated. In the following chapter, the qualitative methodology and data sources used in the published research on integrating art and environmental education, as well as research in environmental education which uses art as a research instrument, provide reference points for the design of the research of this study.

University of Cape Town

CHAPTER THREE

METHODOLOGY FOR RESEARCHING CHILDREN'S LEARNING EXPERIENCES THROUGH ART

3.1 Introduction

This chapter provides more details about the case being researched, the methodology used, as well as data collection and its analysis. Details are also given about the researcher's previous studies and the procedures used regarding research ethics for the case study. The methodological issues of the role of teacher as researcher and that of validity and reliability are also discussed.

3.2 The Case Study

3.2.1 The site and programme

As described in the introductory chapter, the site for the case study was the Gold Fields Environmental Education Centre in the Kirstenbosch National Botanical Garden, where the researcher taught during school holidays from 1995 to 2007. The workshops at Kirstenbosch were chosen because the researcher first observed there that childrens' artworks portrayed their learning experiences. The methodological implications of being a teacher-researcher are discussed further on in this chapter (section 3.6).

3.2.2 Workshop details

Two workshops on the theme of biodiversity took place on the 15th and 16th of July, 2004. The second workshop was a repetition of the first, with a different group of children. Each session lasted five hours, from 9:00 to 14:00, which included time for the administering of research instruments. The workshops had been advertised to the general public as being suitable for Grades 4 to 7.

The workshops were single morning sessions, in which the children were given an introduction to the theme of biodiversity, an interactive guided walk and a refreshment break, followed by the teacher using the video-microscope to show them the details of freshly collected plant material and feathers. After being shown examples of other children's art on biodiversity from the pilot study as well as the dried plant material they were to use, they created their own art. The art activity comprised making mixed media collages using watercolour paints, pencils, pencil crayons, oil and chalk pastels, coloured modelling beeswax, dried plant material and feathers on recycled cardboard covered with paper (A3 size). A wide variety of media was offered as this gave the children opportunities for varied depiction appropriate to the scope of the theme of biodiversity, both conceptually and in detail of content. Instruments of data collection were applied afterwards in the form of interviews, questionnaires about themselves and a question about explaining the artwork in writing.

The ages of 16 children in each group ranged from nine to twelve years. Questionnaires completed by the children revealed that all 32 children lived in middle income or affluent areas and attended moderately or very well resourced schools. The majority (26) were from so-called European or White South African cultural backgrounds. Of the rest, three were from Muslim cultural backgrounds, two from so-called Coloured South African cultural groups and one from a Shona (Zimbabwean) background. Twenty-eight of them resided in Cape Town.¹ Just over half the children (18) were attending workshops presented by the teacher at Kirstenbosch for the first time and the rest (14) had previously attended workshops presented by the same teacher at Kirstenbosch but on different environmental themes or topics.²

The children had experienced minimal prior exposure to the concept of biodiversity. This was ascertained through discussions with them during the introduction to the theme at each workshop.³ The theme of biodiversity had not been developed in any depth at their schools. Its only mention in C2005 (Department of Education, 1997b;

¹ Children who did not reside in Cape Town were Lucy, Norman, Rebecca and Carey (the latter having moved recently to Johannesburg from Cape Town). Norman and Rebecca were regular visitors to Cape Town. Lucy had last visited Cape Town four years previously. [Names have been changed throughout the dissertation.]

² Children who had attended workshops previously were Ashleigh, Brian, David, Jenna, Judy, Julian, Marina, Melissa, Michelle, Sasha, Savannah, Susan, Tao and Zaitoon.

³ Videotapes and transcripts of audiotapes, 15/07/04; 16/07/04.

1997c) was for Grade 7 in one of four themes (Life and Living) in the Natural Sciences Curriculum. The RNCS developed teaching about the concept in the Natural Sciences curriculum to a greater degree in Grade 7, with possibilities for teaching about the concept in the earlier grades. However, its implementation had only begun six months prior to the workshops.

3.3 Research Methodology

3.3.1 Case study

The researcher used the methodology of case study. A case study permits an in-depth investigation to explain a phenomenon in a unique set of circumstances (Merriam, 1998:19, 33). Case studies take place in real life situations in context (Yin, 2003:13). They are bounded in place, events and time (Merriam, 1998:27). In terms of end products, case studies aim for description, which takes the whole case into account and enables new understandings for the reader (1998:29-30). The research on the children's learning experiences from creating artworks during the workshops at Kirstenbosch required such a research method. The artworks are examined in the context of the workshop as a whole, to gain understanding of the nexus between art and environmental education in this case. The researched workshops maintained authenticity to the existing programme through the means of advertising for the pupils, the activities offered and the presence of teenage assistants.

3.3.2 Qualitative research

In a qualitative approach to research, the understanding of participants' perspectives is central (Merriam, 1998:6). This approach was appropriate for finding out about the children's learning experiences, as seen in their artworks. The sources of data for qualitative research were suitable for gathering information on the children's learning experiences. According to Merriam (1998:69-70), these data sources comprise documentary evidence (including artefacts such as artworks), observations (recorded through notes directly or from videotapes) as well as interviews. The multiple modes or sources of data enable triangulation of data during analysis, which builds understandings (Merriam, 1998:204) and confirms findings (ibid.; Miles and

Huberman, 1994:267). Findings point to theory through inductive methods, where data is examined not to test theory, as in deductive approaches, but to explore conceptual connections (Glaser, 1992:16; Merriam, 1998:6). Data is analysed in detail (Merriam, 1998:159-160). Features of the research at Kirstenbosch included qualitative data sources and detailed analysis, as well as triangulation of data through convergence and concurrence to gain understanding of the learning experiences of the participants.

3.4 Research Ethics

3.4.1 Ethics form

The completed form required for the Research Ethics Committee of the Faculty of Humanities of the University of Cape Town (UCT) was approved by the two supervisors and passed by the Committee.

3.4.2 Consent from the site of research

The researcher discussed the forthcoming research with the head of the Environmental Education Centre at Kirstenbosch and agreed to keep him informed during the research process. No problems were encountered from the head or the organisation, SANBI, about the conducting of the research.

3.4.3 Consent from children and parents

The children were informed of the research at the beginning of the workshops. Parents were not told about the research before the workshops as the two supervisors of the research were of the opinion that this might cause unnecessary concern and caution. Instead, parents were given letters at the end of each of the workshops informing them of the research and inviting them to ask questions. This provided them with the opportunity to object and withdraw the data if they wished to do so. No parents withdrew the data.

3.4.4 Ethics in data collection, analysis and reporting

During the collection of the data, care was taken to be sensitive to the children during interviewing so they did not experience coercion. This was achieved through asking questions about their artwork which they would be able to answer easily and giving affirming responses to their answers. The ethical issue of educational responsibility for the children when the research instruments were administered was resolved by the educational function of the questionnaire, interview and written work. In accordance with Merriam's guidelines, during the later analysis of the data, the researcher strove for accuracy and honesty (1998:216). The children's names have been changed.¹ Names on the artworks were covered by a strip in the photographs of the artworks to protect their identity. The teacher-researcher's biases were made evident (ibid.) through the description of her involvement in the programme.

3.5 The Researcher's Previous Studies

3.5.1 Research projects

Stake (1995:49–50) and Merriam (1998:24) emphasise the value of practical experience in qualitative research methodologies. The researcher conducted two previous research projects at Kirstenbosch in an action research framework (Nepgen, 2002; 2003), which according to May (1997:226) and Le Roux (2005:183) is used for the understanding and improvement of practice. Data were collected, analysed and reflected upon and the results implemented, as described by Le Roux (2005:183), with the cycle repeated in the second project only. These projects gave the researcher experience in managing the research process while teaching, as well as in qualitative data collection and analysis.

The findings of the first project included the equal importance of both the walk and the art to the children, their appreciation of explanations and knowledge gained about the natural environment and the strength of the children's imagination, as depicted in their art. These findings contributed to the framing of the current research. The second

¹ Muslim names were retained in the choice of the research pseudonym where the original name reflected this culture.

project also contributed to the framing of the research in that it emphasised children's learning experiences in context.

3.5.2 Pilot study

An exploratory pilot study of a workshop for 15 children aged eight to twelve years, took place during the school holidays at an indoor venue next to public open space in Constantia.¹ The children were drawn from the researcher's weekly art classes during the school term. The session comprised an introductory talk, a guided walk and an art activity. The theme of the workshop was biodiversity and the art activity used materials similar to the Kirstenbosch workshops.

Insights from the pilot study included the importance of obtaining the understandings of each child about the artwork through interviews and written work. The concepts depicted in the artworks were collated into clusters during the analysis of the artworks in the pilot study. This clustering of concepts became a method in the case study analysis. A preliminary finding from analysis of the pilot study data was that each child's artwork differed considerably from the others in its depiction of biodiversity.

During the pilot study, the researcher interviewed the children at the teacher's table, where some had felt self-conscious. As a result, at Kirstenbosch, the researcher interviewed the children at the tables where they had been working.

3.6 The Role of Teacher as Researcher

3.6.1 Methodologies for teacher-researchers

Lawrence Stenhouse, in his seminal work, proposed that teachers become researchers in their own classrooms for the development of curricula (1975:142–143) and the improvement of practice (1975:156–157). He proposed that research by teachers of their work in action is the means for achieving this. Stenhouse wrote that such research can be part of case studies (1975:130–141). He also used the term 'action research' for methods of evaluating teaching in repeating cycles (1975:163–164). The

¹ 01/04/04.

cycle of planning, implementation, reflection developed as an intrinsic part of action research methodology (Le Roux, 2005:183).

According to May, who discusses this in an article for art educators (1997:226), action research can be used for the purposes of solving problems and the improvement of practice as well as for the teacher's search for understanding. She defines action research by "its explicit inclusion of reflection, its attachment to practice, and its reflexive features" using the same instruments for collecting data as in other field-based methodologies. These instruments include participant observation, interviews and the study of student work (1997:229, 232).

The researcher in the study of the dissertation did not use an action research methodology with its cycles of planning, implementation and reflection. Even though data collection methods were used that were similar to those used in action research, case study was chosen as appropriate for investigating the integration of art and environmental education. However, action research elements are present in the research, such as a search for understanding. Therefore there is also a possibility of improvement of practice from the findings as in action research.

3.6.2 The question of objectivity

The question of objectivity is particularly pertinent in the situation where a teacher researches workshops she is facilitating with a methodology other than action research. In action research, subjective insights are essential to the improvement of the researcher's own practice (Stenhouse, 1975:157). However, similar to other forms of qualitative research, the researcher is the instrument and is also often in the role of participant observer (Merriam, 1998:101), as in this study. This has the advantage of increasing responsiveness to the context and resulting in the data, leading to insights and understanding (Merriam, 1998:20). However, as the researcher's perspective shapes the findings of the research it also implies that the research is prone to subjectivity.

Eisner (1998a:43-61) argues that in qualitative research, where the researcher is the instrument, a middle path between objectivity and subjectivity is forged. Based on

Dewey's views of educational experience (1938), Eisner postulates that the mind mediates between the objective and subjective for the qualitative researcher and that the locus of experience is found between the two (Eisner, 1998a:52). Criteria for appraising accounts of qualitative research depend on coherence of the account and consensus among readers of the account that interpretations are consistent with their experience or with the evidence, as well as the instrumental utility of the account (1998a:53-60).

The means used to counter bias in this study are included in the discussion on ensuring validity and reliability of the findings.

3.6.3 The practical considerations of researching the case as teacher

Issues raised by the methodology of an educational case study being undertaken by the teacher in the case, include the demanding task of managing the recording of the workshop while teaching, as well as being teacher while applying the research instruments after the teaching phase. These were ameliorated by the teenage assistants who, over and above their duties, which were similar to those in previous workshops, helped with the recording and conversed with children in the Education Centre garden when they were waiting after the completion of their interviews and written work.

3.7 Data Collection and Analysis

3.7.1 Overview

Data was collected regarding the content of the artworks dealing with the theme of biodiversity. Data was also collected on the content of workshops which gave rise to the artworks. In accordance with qualitative case study methodology, comprehensive data were collected in order to obtain a rich description of the focus of the research (Merriam, 1998:38). The data comprised the artworks, children's written work and questionnaire responses (researcher generated documents), transcripts of interviews about the artworks (conducted with the children individually and with an environmental educationalist) as well as videotapes and transcripts of the workshop

supplemented by the researcher's notes (observation data). The comprehensive data enabled the recording of both the learning experiences and the teaching.

During the workshops, all proceedings (indoors and out) were videotaped. Audiotapes were made from the videotapes. Proceedings were also audiotaped with hand-held or tabletop recorders to fill in any gaps in the videotape and to ensure accurate deciphering for transcription, except where not possible. In this way, the researcher recorded the teaching input, the creation of the artworks, the interviews and the application of the other research instruments (written work and questionnaires). The children became used to the presence of the recording instruments very quickly.¹

The data collected were organised into a case study database including audiotapes, videotapes, transcripts of the teaching and interviews, the researcher's notes of observations and photographs of the children for purposes of identification. Also included was a file for each child with a photograph of the artwork created at the workshop, original written work, transcript of the interview after the art activity, completed questionnaire and notes from the interview when returning the artwork.

The general means of analysis was identifying categories and sub-categories relevant to the research question. As each data source and combinations of data sources were examined they were categorised (Merriam, 1998:179–185). Glaser (1992:37–40) and Yin (2003:110) describe the identification of categories during the initial examination of data through conceptual frequency. Glaser (1992:37–40) explains how sub-categories of these categories become evident through further analysis. The sub-categories or properties are less abstract concepts of the conceptual categories. Detailed analysis of content was used for the description of the sub-categories, where the artworks, other researcher-generated documents and transcripts were examined. The categories and sub-categories identified through the analysis, became the findings (Merriam, 1998:192). Triangulation of the data during the analysis assisted in the building of categories and sub-categories about the children's environmental depiction in the artworks. This is explained further in the section on analysing the artworks below (section 3.7.3.2).

¹ Observations from videotapes as well as researcher's notes, 15/07/04; 16/07/04.

Once analysed, the data were organised into a digital database with an entry for each child¹, as well as a group entry in which the data for the children were collated² and an entry for the analysed teaching content.³

3.7.2 The observations

3.7.2.1 Data collection

The workshop was recorded through videotapes and audiotapes so that the teaching could be analysed to see which aspects of it were reflected in the artworks. Videotaping the workshops made observation after the workshops possible. The data were also used for information about individual children's responses and the responses of the group during the different sections of the workshop. The researcher made notes during and just after the workshop, which supplemented the analysis of the videotapes and audiotapes. The researcher or assistant took photographs of the children in pairs at the end of the workshop, with their name labels clearly showing, in order to help identify the children on the videotapes.

3.7.2.2 Analysing the data

The audiotapes from the videotapes and tape recorders were transcribed for detailed analysis of the teaching content and the children's responses. Pertinent observations from the videotapes were added to the transcripts. The content of the teaching was analysed according to categories which corresponded with the categories of 'Concepts depicted' and 'Personal responses expressed about the concepts' identified through the analysis of the artworks. The categories for the analysis of the teaching in the different sections of the workshop comprised 'Concepts' ('Introduced'⁴ and 'Repeated') and 'Teacher's personal responses about the concepts' ('Introduced' and 'Repeated').⁵ Data from observations were used to support data from other sources during the analysis.

¹ Appendix 2.

² Appendix 3 and Appendix 4.

³ Appendix 1.

⁴ "Introduced" means presented to the children for the first time in the workshop.

⁵ Appendix 1.

3.7.3 The artworks

3.7.3.1 *Collecting the data*

The artworks produced by the children in the workshop about biodiversity are the main data for examining the nexus between making art and environmental education. According to Ball and Smith (1992:2), visual phenomena can serve as tangible objects for analysis and are documentary sources (1992:20). These include artworks (ibid.). Artefacts such as works of art serve as evidence (Yin, 2003:96).

The children's brief for creating artworks was to express an idea to do with biodiversity.¹ The teenage assistants were instructed not to help with the artworks. The children decided when they were complete. The artworks were retained after the workshop with the promise that they would be kept safe and returned to the children. They agreed to this arrangement without demur.² Before photographing the artworks, the researcher checked that the artworks were in the same condition as when they had just been completed. This was achieved by watching the videotapes of children being interviewed about their artworks, which focused on the pictures. If plant material or coloured beeswax had fallen off subsequently, the researcher replaced it exactly. The artworks were then photographed for analysis.³

3.7.3.2 *Analysing the data*

The researcher examined the photograph of each artwork for what could be seen in them, as well as the children's explanations.⁴ In order to understand the children's environmental depiction in the artworks, data was triangulated through convergence and concurrence from different data sources: the artworks, the child's explanations in

¹ Transcripts of videotapes and audiotapes, 15/07/04; 16/07/04.

² Researcher's notes, 15/07/04; 16/07/04.

³ The researcher photographed the artworks in diffused light. She used a Pentax ESPIO 738S and 400ASA analogue film at midday outside under cloud cover (conditions available frequently in Cape Town during July). She was careful to stand so that her shadow did not occlude the artwork. The quick shutter speed ensured minimal blurring with a hand held camera and the light conditions resulted in clear photographs with just enough shadow for a 3-D effect from the chunkier plant material. Two sets of photographs were printed and the prints closest in tone and colour to the original artwork were retained, with the other print being given to the child when the artwork was returned. The film was converted professionally to a digital format of a high resolution for inclusion in the digital database.

⁴ Using recorded art as in prints or photographs, with the actual size noted, is an accepted convention in art criticism and analysis. It must be noted that prints can elevate the general appearance of an artwork (Cowan, 2008) through the reduction, gloss and conversion to two dimensions.

the written work and interview responses, as well as interpretations from an independent environmental educationalist during interviews. Categories regarding concepts and affective responses about the environment, as well as regarding artistic means of depiction were identified after the initial examination of the data, as outlined in sections 1.6 and 4.1. Further analysis provided a detailed description of subcategories.

The results were entered into the database under each child's name and photograph of the artwork.¹ The researcher examined the collated data in their categories.² More details about the analysis of the artworks and the results are found in Chapter Four.

The initiating of artworks about the environment together with interviews and/or writing on the art is a method applied by several research studies, as discussed in Chapter Two. These include studies on integrating art and environmental education (sections 2.3.1.2 and 2.3.1.3), studies using art and mainly interviews to ascertain children's perceptions of the environment (section 2.3.1.5) and a study which used art as a stimulus for speaking and writing about nature (section 2.2.2.2).

3.7.4 The interviews

3.7.4.1 Collecting the data

After the artwork had been completed, each child was interviewed for five minutes. The children stayed seated where they made the artwork, which put them at ease.³ The children were asked to tell the researcher about their artwork. She asked other questions that would clarify content, so as not to make incorrect assumptions about the children's intentions with regard to the content and meaning of the artwork.

3.7.4.2 Analysing the data

The interviews were included in the triangulation of the artworks with other data, as previously explained. The results for each child were added to the database, together

¹ Appendix 2.

² Appendix 3 and Appendix 4.

³ Researcher's notes: pilot study, 01/04/04; 15/07/04; 16/07/04.

with relevant quotations from the interview for 'Concepts depicted' and 'Personal responses expressed about the concepts'.¹

The information from the interviews formed part of the collated data in the categories regarding concepts and affective responses about the environment.²

3.7.5 The questionnaires

3.7.5.1 Collecting the data

After the interviews, the children filled in a questionnaire.³ The questionnaire was designed to give the researcher background information in order to increase her understanding of each child and his or her artwork. The children filled in multiple choice or short answer questionnaires (in the format of an enjoyable activity with a visual arts approach) which gave the researcher information about them, their homes and their schools. This included information on age, birthday and grade (needed for the analysis of the artworks) as well as school name, home address and telephone number (needed for the group profile and for returning the artworks). A sketch of themselves in the clothes they were wearing on the day assisted in the identification of the children in the videotapes. Before the workshops, the questionnaires were examined by the two supervisors as well as a psychologist working for the Western Cape Education Department, experienced in administering tests and questionnaires to these grades. The researcher went through the questions with the children before they filled in the questionnaire. Any answers given by the children that required clarification received attention in the interviews when the artworks were returned.

3.7.5.2 Analysing the data

The researcher identified personal details relevant for the analysis: the ages and grades of the children (for their stage of conceptual development), their addresses (to ascertain their socio-economic bracket), whether they lived in Cape Town and whether the school they attended was well-resourced (for the description of the group).

¹ Appendix 2.

² Appendix 3 and Appendix 4.

³ Appendix 5.

Data relevant for a description of the group attending the workshops was collated and added to the group database. The name, age and grade for each child were added to his or her entry in the database. If they did not live in Cape Town, this was also noted in the entry.

Data from the questionnaire was used to triangulate with data from other sources during the analysis.

3.7.6 The written work

3.7.6.1 Collecting the data

After completion of the interview and questionnaire, the children wrote answers to the question: "Tell me what your artwork was about. You can do some drawings as well." The question was typed at the top of the page.

3.7.6.2 Analysing the data

The written work was included in the triangulation of the artworks with other data as previously explained. The results of the triangulation for each child were added to the database, together with relevant quotations from the written work for 'Concepts depicted' and 'Personal responses expressed about the concepts'.¹

The information from the written work formed part of the collated data in the categories regarding concepts and affective responses about the environment.²

3.7.7 Interviews with an environmental educationalist about the artworks

3.7.7.1 Collecting the data

The researcher conducted two unstructured interviews of 90 minutes each with an environmental educationalist, who looked at the original artworks before they were

¹ Appendix 2.

² Appendix 3 and Appendix 4.

returned to the children.¹ For each artwork, the researcher gave a brief indication as to what the artwork was about according to the child, whereupon the environmental educationalist made comments specific to the artwork and the general to the body of work. These comments were audiotaped and transcribed.

3.7.7.2 Analysing the data

The interview about each child's artwork was analysed according to the categories of 'Concepts depicted' and 'Personal responses expressed about the concepts', which had been identified from the other data sources. The statements of the environmental educationalist were then placed on the database for each child.² The comments provided interpretation by a qualified third party to triangulate with the comments of the child in the interview and written work as well as with the artwork.

3.7.8 The interviews on returning the artworks

3.7.8.1 Collecting the data

The interviews conducted on returning of the artworks to the 32 children took place mainly at their homes and, for a few, in their school grounds when school was over. The researcher conducted short five minute interviews, recorded in notes, for the purpose of clarifying any details after having looked at each child's artwork, written work and questionnaires as well as the transcripts of the interviews about the artwork with the child and with the environmental educationalist.

3.7.8.2 Analysing the data

Any information which provided clarity on the data was added to the child's entry in the database and was used in the analysis (with the source identified as the interview on returning the artwork).³ Additional information given to the researcher either by the child or the parent during the interview was used to support data from other sources during the analysis.

¹ Wendy Hitchcock (botanist, environmental educationalist and artist), 08/08/04/, 09/08/04.

² Appendix 1.

³ Appendix 2.

3.8 Validity and Reliability

3.8.1 Internal validity

Methodological procedures used to achieve internal validity included thorough and detailed analysis of data (content of the teaching, the artworks and interviews in this case) to ensure a coherent account, as described by Eisner (1998a:53-56). Triangulation through convergence and concurrence of multiple sources of data (as in the analysis of this research) also achieves validity through confirming findings (Miles and Huberman, 1994:267) and building understanding (Merriam, 1998:204).

Other procedures used to achieve internal validity included giving the transcripts from interviews with the environmental educationalist to her for checking. Any uncertainty from the data involving the children was checked with them at the interview when the artworks were returned to them.

These methodological procedures, used to achieve internal validity, reduce researcher subjectivity. Clarifying the researcher's biases through making her role as teacher explicit adds to the validity.

3.8.2 Reliability

Reliability in qualitative research cannot mean that the research can be replicated exactly as in quantitative research, because each situation is different when the perspectives of the participants are central to the examination (Merriam, 1998:205). In qualitative research, reliability is achieved through the dependability of the results and not their ability to be replicated (Merriam, 1998:205-206). Eisner's criteria of consensus for appraising accounts of qualitative research (1998a:56-58), where readers agree that interpretations are consistent with their experience or with the evidence, refer to dependability. In this research, an audit trail through the case study database, an explanation of methods and choice of case in context, rigor in data presentation and analysis, as well as the internal validity of the research assists in establishing reliability for future research. These factors also assisted in reducing covert researcher bias.

Reliability, in the sense of repeatability is achieved through having two almost identical workshops. These workshops resulted in subsets of data similar to each other which assist in establishing reliability. Any differences between the workshops or the data have been noted in the findings.

3.8.3 External validity

External validity refers to the suitability of the findings for generalised applicability beyond the sample population used in the research. As a case study examines a unique situation in a real life context, the participants are not chosen for the purposes of generalising to the population from which they were drawn, as with the probability sampling of quantitative research (Merriam, 1998:61–62). Forms of generalising have been proposed by authors for educational case studies. These include 'naturalistic' generalization where people's actions are guided by understandings in reported research which relate to their own experience and situation (Stake, 1995:85) and 'fuzzy' generalisation, where similar occurrences are qualified as being possible in other situations (Basse, 1999:51–53). Merriam refers to reader or user generalisation (1998: 211) where the readers decide what aspects can be used. To facilitate these various forms of generalisation, the reporting of this research includes explicit detail and comparison with other programmes (ibid.).

3.9 Application to the data

In the following chapter the methods of analysis described here are applied to the collected data. The artworks and interviews are described in detail in the context of the teaching in terms of the categories and sub-categories identified by the analysis. This description reveals the learning experiences of the children at the nexus of art and environmental education.

University of Cape Town

CHAPTER FOUR

CHILDREN'S ARTWORKS AND EXPLANATIONS REVEALING THEIR LEARNING EXPERIENCES

4.1 Introduction

In accordance with Ball and Smith's guidelines for analysing visual data (1992:20), the artworks produced by the children were treated as documentary sources for evidence of the role of creating art in a workshop for environmental education about biodiversity. Thirty-two artworks were produced (sixteen on each of the two days the workshops took place).¹

The children created the art after being taught about biodiversity through an introduction to the theme in the classroom at Kirstenbosch, a guided walk in the Garden, the teacher's demonstration of specimens under the video-microscope and an explanation of artworks from the pilot study. The pictures were made on A3 cartridge paper which was pasted onto recycled board. The art materials comprised paint, pastels, pencils, pencil crayons, coloured beeswax, as well as alien and indigenous plant material and feathers.²

Their task was to create an artwork on the theme of biodiversity, with the emphasis on expressing an idea. At the first workshop, the researcher told the children, "The artwork that I want you to do is going to be on the theme of biodiversity...think about it and decide what you're going to do and have for yourself some idea of what you're going to show ... there must be something that you are trying to say, some idea".³ She gave similar instructions at the second workshop.

It was evident on first inspection that the artworks differed from each other significantly in visual content, depiction of concepts and feelings as well as the artistic

¹ Appendix 2 contains the photographs, description and analyses of the children's artworks.

² The children used alien plant material (not necessary from invasive species) to represent alien invasive plants in the artworks.

³ Transcripts of videotapes and audiotapes, 15/07/04.

means of expression. The researcher used four categories to analyse each artwork. These categories were identified from the data and supported by the literature (described in Chapter Two) as being significant to the nexus of art and environmental education. The categories comprise the following: types of depiction (literal/metaphoric/symbolic and imaginative/observational); concepts depicted; personal responses expressed about the concepts; and the use of materials. The researcher identified sub-categories, which are described in detail.

In order to analyse the artworks in the context of the workshop, the content of the teaching in the different sections of the workshop was examined according to categories which corresponded with two of the categories identified through the analysis of the artworks. The categories for the analysis of the teaching comprise 'Concepts' ('Introduced' and 'Repeated')¹ and 'Teacher's personal responses about the concepts' ('Introduced' and 'Repeated').² The latter referred to the teacher's explicit personal responses, identified through her words, which were emotive or advocatory, indicating an attitude, concern or aesthetic response.

Before proceeding with analysing the artworks according to the four categories, the researcher described what was evident in the visual content of the artwork as a basis for the analysis. She obtained a description of the visual content through examining the artworks in terms of the separate pictorial components and the materials (including how the surface was covered), as well as the use of line where applicable. She did not use the descriptions to make any deductions. Describing the artworks also focused the researcher on the details that were needed for further stages of the analysis. Charles's artwork, for example, was described as follows:

The artwork shows the upper torso and head of man made from indigenous plant material (excepting for the nose) as well as an indigenous feather, with the spaces in between the plant material filled in with paint (green for the torso, yellow for the head). Scales from alien pinecones form the nose. A blue sky is painted in as background. The whole surface is covered with paint.

¹ "Introduced" refers to the children being exposed to a concept or attitudes for the first time during the workshop. "Repeated" refers to the times thereafter in the different sections of the workshop.

² Appendix 1.

4.2 Types of Depiction (Literal/Metaphoric/Symbolic and Imaginative/Observational)

4.2.1 Method of identification of types of depiction

It was evident on first inspection that some children rendered a literal depiction while others gave a metaphoric or symbolic depiction.¹ An initial examination showed that no children had created artworks based entirely on observations. If the picture depicted literal content, the researcher identified whether a component of the artwork was based on the child's observations during the workshop (through videotapes and transcripts of audiotapes) as well as whether the depiction as a whole was derived from the imagination. Metaphoric and symbolic depictions were described as imaginative renderings as discussed by Efland (2004): "Imagination refers to the cognitive processes that enable individuals to organize or reorganize images, to combine or recombine symbols as in the creation of metaphors or narrative production" (2004:757).

The researcher also described subtypes of literal, metaphoric or symbolic depiction. The analysis of the subtype gave an overview of the themes (literal) and devices (metaphoric or symbolic). When literal, the general description was given with a qualification, such as 'a landscape (garden scene)'. When metaphoric or symbolic, the forms or devices were noted, for example Charles's artwork was described as a symbolic portrait.

4.2.2 Literal, metaphoric and symbolic depiction

4.2.2.1 Literal depiction

Most of the children depicted literal content in their artworks (23 out of 32 children). Of these, the majority were landscapes (17 out of 23). The landscapes included garden

¹ In this chapter, a metaphoric depiction is an image that refers to an object or action that it does not literally denote, in order to imply a resemblance. A symbolic depiction is an image that represents or stands for something else usually by convention or association, especially to represent something abstract. A literal depiction refers to an artwork consisting of literal content. As mentioned in section 2.2.3.2, a literal depiction in art is also a metaphor, as it represents reality (Efland, 2004:756), but it is referred to as a literal depiction in this chapter to distinguish it from a metaphoric depiction.

scenes (eight children),¹ the countryside (Alice, David, Kelly and Sasha), general, undefined landscapes (Gregory, Judy and Tao), an artwork with both land and sea (Norman) and a two-part picture with both a general, undefined landscape and a cityscape (Julian). Julian told the researcher, "This part here is what we want it to look like [landscape], but this is what will happen if we don't look after the nature [polluted cityscape]".²

Literal depictions (as opposed to metaphoric or symbolic) also included imaginary flowering plants (Andy and Shahied), a building scene of a bulldozer clearing plants (Zaitoon), a still life (Nicholas) and one artwork that was decorative, with the bottom tier a garden scene and the top a row of plant material (Ashleigh). Ashleigh said, "I copied it [the picture of the sunbird] ... and then I just decorated around [with] the things that were over there ... I thought if I would just do one type of plant then it would be a bit boring."³

Some of the literal depictions had symbolic elements. Gregory's landscape had a man destroying a plant, symbolising extinction,⁴ Norman's coastal scene had symbolic meaning (the possible permanent destruction of nature⁵ and its beauty)⁶; Lucy's background had symbolic meaning (colours blended together to show the variety in nature working together)⁷; Tao's artwork had symbolic colour in four instances (such as "the blended colors means groth and health").⁸ Nicholas's artwork had a symbolic background (vigorous strokes of green behind his still life to show that "the land is angry with these people" who pick endangered plants).⁹ Brian's artwork had symbolic colour (blue behind the alien plants to show that "they probably came from across the

¹ Jodie, Kim, Lindi, Lucy, Marina, Michelle, Natalie and Savannah.

² Interview after completing the artwork, 16/07/04.

³ Interview after completing the artwork, 16/07/04.

⁴ Interview with environmental educationalist (Wendy Hitchcock), 08/08/04.

⁵ In this dissertation, 'nature' refers to all natural phenomena as well as plant and animal life as distinct from man and his creations.

⁶ Interview after completing the artwork, 15/07/04.

⁷ Comment to the researcher, 21/07/04.

⁸ Written work 16/07/04. Throughout the dissertation the children's spelling written work will be quoted with their spelling and punctuation as they wrote it.

⁹ Interview after completing the artwork, 01/07/04.

sea”)¹ and Judy’s artwork has symbolic representations of birds (“I just did feathers just to like show the birds”).²

With some exceptions, the younger children of nine or ten years of age depicted literally and the older children of 11 or 12 years³ depicted metaphorically or symbolically. The exceptions for the younger children were Jenna and Susan, who depicted metaphorically but with literal elements (section 4.2.2.2). The older children who rendered a literal depiction either did not do a straightforward literal picture or had known learning challenges. The artworks of Andy (11:4)⁴ and Shahied (11:9) were both of imaginary flowers, with decorative backgrounds (not literally depicted scenes). The landscape of Norman (11:4) had symbolic meaning. Julian (12:3), Nicholas (11:2) and Sasha (11:7) had learning difficulties and this may have contributed to their choosing to do a literal expression.⁵ The trend to greater metaphoric depiction with increase in age accords with Burton’s description of children’s development of symbolic representation in art as they gain experience of concepts, feelings and the sensory world (2000:335).

4.2.2.2 Metaphoric and symbolic depiction

Of the metaphoric depictions (seven altogether), the five older children showed the threat of invasive alien vegetation to indigenous vegetation (Carey, Iqra, Manon, Melissa, Solomon), as illustrated by Carey’s creatures made out of alien plant material in battle with creatures made out of indigenous plant material who are “fighting back because they were there first”.⁶ The two younger children, Jenna (10:5) and Susan (10:9) depicted the beauty of variety in indigenous plants as well as interdependence in nature through arranging items on a coloured background. Jenna explained what her artwork was about: “... how the different plants live together and about biodiversity

¹ Interview after completing the artwork, 16/07/04.

² Interview after completing the artwork, 16/07/04.

³ Throughout the dissertation, the term ‘younger children’ refers to children of nine and ten years of age, while the term ‘older children’ refers to children of 11 and 12 years of age.

⁴ The age of the children is given in years, with the months following the colon.

⁵ Nicholas had Attention Deficit Hyperactivity Disorder. Julian was dyslexic and Sasha had mild cerebral palsy which affected her right arm and cognitive abilities. The researcher was informed about Nicholas and Sasha’s difficulties before the workshop (16/07/04) and about Julian’s when returning the artwork (01/09/04).

⁶ Written work, 15/07/04.

and stuff, all work together ... Yes, like everything looks nice together. It doesn't have to be on its own."¹

The two oldest children depicted symbolically. Rebecca (12:10) depicted the threat of alien vegetation to indigenous vegetation using motifs such as the "circle of life"² as symbols. Charles (12:7) depicted the interdependence of people and plants with a portrait of a man made from plants. He said, "It's showing that both people and animals and plants are all combined so seeing as we're combined we might as well try and help each other."³

Using symbol and metaphor in the artworks either as a whole or as elements in a literal depiction enabled the children to show their understanding of concepts. The stimulus of explaining their artworks containing metaphor and symbol in all likelihood assisted this understanding. Through the art, the children could give form to complex ideas in a tangible way. Eisner (2002:21) writes of symbols being a proxy for nested levels of meaning. According to Burton (2000:338) symbols in art enable children's understanding to be structured and extended. Elland (2004:757) writes: "As used in the arts, metaphor creates a space in human cognition where individuals are free to rehearse new ideas of expression and form." The use of metaphor presupposes an understanding of its underlying context (2004:769). According to Burnaford, Aprill and Weiss (2001:17), creating art helps children to think metaphorically, allowing them to make connections between different ideas, which is a principle at the basis of an integrated curriculum.

4.2.3 Imagination and observation in depiction

Each artwork as a whole is based on the child's imagination as opposed to only on observation. Some literal renderings have components that could have been derived from observation during the workshop (five instances), such as the guinea fowl in Jodie and Kim's artworks being influenced by having seen the birds in the Education Centre garden. Other literal renderings have components drawn directly from

¹ Interview after completing the artwork, 15/07/04.

² Interview after completing the artwork, 15/07/04.

³ Interview after completing the artwork, 15/07/04.

observation (three instances). Kelly¹ and Ashleigh² copied a sunbird from a poster (Kelly used a book as well). Kelly also copied a plant on the teacher's desk.³

The use of imagination in the recreation of images from past experiences (Eisner, 1998b:24-27; Efland, 2004:771) and in the use of metaphor or symbol (Efland, 2004:757) is likely to be due to the art being done in the classroom, as opposed to being sketched directly from nature. The latter use of art is described by Joicey (1993), Holmes (2002), Morin, Stinner and Coffman (1997; 2004), Stander and Van Aarde (2005) and in the guide to biodiversity education of the Environmental Education Programme, University of Stellenbosch.

4.3 Concepts Depicted

4.3.1 Method of identification of the concepts

After completing the artwork, each child explained his or her work in an interview and in writing. It was evident from an initial perusal of the transcripts, written scripts and artworks that specific concepts had been depicted clearly in response to the instruction to create an artwork on the theme of biodiversity, with the emphasis on expressing an idea.⁴ Through this depiction, the children showed some learning about the environment. According to Rickinson, environmental knowledge can be regarded as an understanding of concepts about the environment and accuracy of factual knowledge (2001:225).

The researcher ascertained the concepts depicted by each child from the artwork, in conjunction with the sections of the interview and written work, where the child explained the content of the artwork. During the interview, the researcher asked questions to clarify this content. Both the interview and written work were processes of reflection for the children as they explained the artwork.

¹ Interview when returning the artwork, 13/09/04.

² Interview after completing the artwork, 16/07/04.

³ Interview after completing the artwork, 16/07/04.

⁴ Transcripts of videotapes and audiotapes, 15/07/04; 16/07/04.

The researcher identified the dominant concept in each child's artwork through repetition and emphasis in the child's interview and written work. The identification of the dominant concept was also contingent on visual reference to the concept in the artwork and the dependence of associated concepts on the dominant concept. There were repeated checks to ensure that the concepts were correctly identified and that the variations in each child's work were accurately described through reference to the full-length transcripts of the interviews, the original scripts of the written work and the artworks. Attention was paid to the words used by the children as well as to the exact meanings of terms used for the headings and subheadings of the list of collated dominant and associated concepts.¹

In compiling the record for each child, the researcher listed the concepts together with the quotations from the interview and written work from which they were derived.² Comments from the environmental educationalist were also included which provide interpretation by a qualified third party to assist an understanding of the artworks.³ The environmental educationalist studied the original artworks before they were returned to the children. For each artwork, the researcher gave a brief indication as to its meaning according to the child, whereupon the environmental educationalist made comments specific to the artwork and/or to the general body of work.

The following is the record of Zaitoon's concepts, as an example.

Concepts depicted

Threat of building to plants; extinction of plants; endangered plants.

Interview: "It's about to bulldoze something here ... wiping out the plants and stuff ... It could make the plants extinct, so extinction ... or rather endangered."

Written work: "Some people were bulldozing land to build houses on. They were killing the plants that were there. This could cause extinction or the plants could become endangered."

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* "This is a wonderfully graphic picture and she obviously really took it to heart that bulldozers can cause destruction with plants growing here and then being thrown into the background. A very strong portrayal of destruction here."]

¹ Appendix 3.

² Appendix 2.

³ The educationalist's comments are not included in the description of the concepts, which are derived from the child's spoken or written explanation and artwork.

4.3.2 Concepts dominant in each artwork

4.3.2.1 Collating and recording the dominant concepts

The researcher collated and recorded the dominant concepts depicted in each picture from the two workshops.¹ Each child's name was listed under the heading of the dominant concept about the environment depicted, followed by a description or variation of that concept where relevant. Associated concepts depicted by the child, related but secondary to the dominant concept, followed in brackets. The dominant concepts about the environment were then grouped under the relevant general concept. Where two concepts (or two aspects of a concept) were given equal weight or were indivisible, the child's name was listed twice under headings for the dominant concepts. An extract from Appendix 3 for 15/07/04 follows:

Interdependence

Interdependence of people and nature

Charles: Interdependence of people and plants/animals (also protection of plants, gratitude towards plants; care for all plants; control of alien vegetation).

Interdependence of plants and animals

Lucy: As above subheading (also variety of plants and animals). See also under 'Beauty of nature (especially interdependence)'.

4.3.2.2 The general concepts

Most of the dominant concepts depicted were about threat (14 children)² or beauty (13 children)³ with Norman included twice in the count as his artwork depicted threat and beauty equally. Of the five children depicting interdependence as the dominant concept (Charles, Kelly, Natalie, Lucy and Susan), two (the latter) also depicted beauty as a dominant concept with equal weight. Variety was depicted by Ashleigh and Judy (the latter depicted beauty as well as variety as dominant concepts with equal weight). Creation and dependence were each depicted once (by Andy and Lindi respectively).

¹ Appendix 3.

² Brian, Carcy, David, Gregory, Iqra, Jenna, Manon, Melissa, Nicholas, Norman, Rebecca, Sasha, Solomon and Zaitoon.

³ Ailee, Jenna, Jodie, Judy, Kim, Lucy, Marina, Michelle, Norman, Savannah, Shahied, Susan and Tao.

4.3.2.3 The dominant concepts about the environment

In relation to threat as a dominant concept, most children showed the threat of invasive alien vegetation to indigenous vegetation (eight children).¹ Solomon wrote: "My art is about aliens and indeginous trees. The aliens ... are trying to take over all the land occupied by the indeginous trees or plants."² Other concepts about threat depicted as dominant concepts were the general threat to nature (Norman), the threat of development to nature (Julian), the threat of development to indigenous plants (Zaitoon), the threat of extinction to indigenous plants (Gregory), the threat of picking or poaching to indigenous vegetation (Nicholas) and the threat of fire to indigenous plants (Sasha). Julian told the researcher, "If we carry on chopping down trees to build more factories which make pollution and if we don't use the right sort of stuff, and use the right sort of equipment, well, this is what the world will look like."³

The teacher introduced the idea to the children of beauty being a concept which could be depicted in artworks when she showed of examples of artworks from the pilot study.⁴ With regard to the beauty of nature as a dominant concept, there were emphases on different aspects of the concept of the beauty of nature (aside from the general beauty of nature depicted by Kim and Norman).

Jenna, Judy, Shahied and Susan emphasised the beauty of nature especially as seen in its variety. Judy wrote, "My picture is about the beauty of nature. I did lots of different kinds of plants and flowers. I did lots of little bugs to |new line| there were beetles and cattipillars. I also stuck down some guinifowl feathers."⁵

Jodie and Lucy depicted the beauty of nature as seen in interdependence and dependence. Michelle and Savannah included the notion of care for this beauty. The artworks of Alice and Tao depicted the beauty of our country, Kim the beauty of ideal nature and Marina the beauty of indigenous vegetation. Jodie told the researcher: "My picture is about the beauty, our beauty of nature, where all our beautiful animals are

¹ Brian, Carey, David, Iqra, Manon, Melissa, Rebecca and Solomon.

² Written work, 15/07/04.

³ Interview after completing the artwork, 16/07/04.

⁴ Appendix 1; transcripts of videotapes and audiotapes.

⁵ Written work, 16/07/04.

gathered around for [pause] for our company ... It's a tree to give them shade and our [us] plant nature ... That's for the bees for the pollen and that."¹

Kim had two dominant concepts, namely of the general beauty of nature and the beauty of ideal nature. She told the researcher: "It's the beauty of nature. It's how they grow in nature."² She also wrote: "My picture is about nature's beauty its so wonderful how all the colours blind in together ... My picture is just showing how plants and animals are sposed to live."³ Other children also had two dominant concepts: Judy had the variety of plants and animals as a dominant concept with equal weight to a dominant concept about beauty. Susan and Lucy also depicted concepts with equal emphasis. Both children had the interdependence of animals and plants as dominant concepts as well as dominant concepts about beauty.⁴

Interdependence as a dominant concept was depicted as the interdependence between animals and plants (Kelly, Lucy, Natalie, and Susan) as well as the interdependence between people and plants (Charles). Kelly wrote: "My picture is about life and how plants and animals work together".⁵ The dominant concept of creation, variety and dependence were depicted as the creation of a new species (Andy), variety in nature with its different types of plants (Ashleigh), variety of plants and animals (Judy), and the dependence of animals on plants and natural conditions (Lindi). Lindi told the researcher: "Well it's to show how important nature is and the animals need like the water and plants that they can eat and drink and survive in nature."⁶

4.3.2.4 Variations of the dominant concepts about the environment

Most children depicted the dominant concepts about the environment with individualised variations (28 out of 32), as seen in the artworks and as explained by the children in the interviews and the written work. These variations demonstrate individualised development of concepts. For example, Zaitoon depicted the concept of the threat of development to indigenous vegetation as being specifically the threat of

¹ Interview after completing the artwork, 15/07/04.

² Interview after completing the artwork, 15/07/04.

³ Written work, 15/07/04.

⁴ Animals includes birds and insects.

⁵ Written work, 16/07/04.

⁶ Interview after completing the artwork, 16/07/04.

building to plants. Her picture showed a bulldozer destroying indigenous plants. Zaitoon use these words in her written work: "Some people were bulldosing land to build houses on. They were killing the plants that were there. This could cause extinction or the plants could become endangered."¹

An example of a dominant concept depicted by more than one child (each with its own variation) is the threat of invasive alien vegetation to indigenous vegetation. This concept was depicted by Carey as the threat of alien vegetation to fynbos specifically. Carey wrote: "In my picture, the fynbos and the alien vegetation are at war, because the aliens are trying to take over the fynbos so that the aliens can get more space, but the fynbos is fighting back because they were there first."² David depicted the threat of invasive alien vegetation to indigenous vegetation as the threat of invasive alien plants to indigenous plants through fire and taking over the land. David told the researcher:

It's just to say that you must stop. You must pull out alien plants and everything like that invades. The alien plants have made like a fire ... and it's like too hot and it's been cracking all the rocks and everything ... and also it's polluting all the other plants and everything ... and then that's soon going to take over the nice place that has got all of our indigenous plants and everything like that.³

There were few exceptions to the children depicting the dominant concepts about the environment as variations, but individualised development of concepts was still a feature (Andy, Kim, Lucy and Norman). Andy was the only child to depict the concept of the creation of new species when he created his own plant in the artwork. Andy said: "I decided to just make up my own sort of flower ... Lots of flowers are coming more species and then they'll get extinct some."⁴ Kim, Lucy and Norman had two dominant concepts each, neither of which was depicted as a variation, but the combination of their two dominant concepts about the environment was specific to each of those children.

¹ Written work, 15/07/04.

² Written work, 15/07/04.

³ Interview after completing the artwork, 16/07/04.

⁴ Interview after completing the artwork, 15/07/04.

4.3.2.5 Individualised development of concepts when the dominant concept about the environment or its variation is the same in artworks

Some children had the same variations of the dominant concept about the environment as another child (seven children).¹ This was ascertained by what the child said in the interview or written work about the dominant concept.

Michelle and Savannah depicted the same dominant concept, as they purposely set out to show the two sides of caring or lack of care for plants and a garden, with the result that both have artworks of the same garden. The development of the concept varies because they depict the different outcomes of care or lack of care. Savannah described her picture: "My half is like your beautiful garden and stuff ... and my person is happy because she's been looking after her garden ... There's nice trees and flowers and stuff, she's giving them water. And now she has a bird living in the trees."² Michelle said about hers: "My little man is a bit sad because he never looked after his garden properly and now it's turned into a disgusting garden ... Well the flowers are dead because you never watered them properly ... And the tree ... he cut off the tree because he needed it for fire wood and he never really cared about it ... the birds don't like his garden."³

For the other five of those children, the development of the same variation of the dominant concept (the threat of invasive alien plants to indigenous plants) came from the associated concepts depicted, as described in the section under associated concepts (4.3.3.3).

4.3.3 The depiction of concepts associated with the dominant concepts

4.3.3.1 Collating the associated concepts

The researcher collated the associated concepts depicted for each workshop by listing them under the headings of the associated concepts about the environment, with a

¹ Iqra, Manon, Melissa, Solomon, Michelle, Rebecca, Savannah and Solomon.

² Interview after completing the artwork, 16/07/04.

³ Interview after completing the artwork, 16/07/04.

description of the variation of that concept where relevant.¹ Some of the associated concepts are the same as the dominant concepts listed (for different children). As with the dominant concepts, the associated concepts about the environment were grouped under the general concept. Extracts from Appendix 3 for 15/07/04 and 16/07/04 follow, each of which shows the general concept followed by the concept about the environment and then the variations of the concept depicted by the children (ascertained from their explanations).

Variety

Variety of plants and animals

Variety of plants and animals (Lucy); variety of indigenous plants (Manon); variety of plants (Solomon)²

Variety

Variety of plants and animals

Beauty of variety of plants (Alice); variety of indigenous plants (Brian); variety of nature as in birds and plants (Kelly); variety of life (Lindi)³

4.3.3.2 The general concepts depicted

Most of the associated concepts were about threats to the environment (22 instances from 15 children,⁴ nine of whom also depicted a dominant concept about threat⁵). The concept of beauty as an associated concept was expressed by only two children (David and Natalie) in contrast to the 13 who depicted it as a dominant concept, with Natalie depicting a concept about beauty as her dominant concept as well. Most of those who chose to depict the concept of beauty expressed this as a dominant concept. All children depicted associated concepts, except for two who depicted one dominant concept only (Ashleigh and Sasha) and Judy who dealt with two dominant concepts.

Other associated concepts depicted which had been depicted as a dominant concept by other children were those of variety (seven children as an associated concept),⁶ dependence (Marina and Natalie as an associated concept) and interdependence (five

¹ Appendix 3.

² 15/07/04.

³ 16/07/04.

⁴ Andy, Brian, Carey, David, Gregory, Julian, Manon, Marina, Melissa, Nicholas, Rebecca, Shahied, Susan, Tao and Zaitoon.

⁵ Brian, Carey, Gregory, Julian, Manon, Melissa, Nicholas, Rebecca and Zaitoon.

⁶ Alice, Brian, Kelly, Lindi, Lucy, Manon and Solomon.

children as an associated concept¹ with only Susan showing a concept about interdependence as a dominant concept as well).

The associated concepts, which had not been depicted as a dominant concept by any child, were those of care (seven children),² control (six children and seven instances),³ protection (five children),⁴ responsibility (Gregory, Julian and Nicholas), gratitude (Charles and Jodie), enjoyment (Melissa and Savannah), place (David and Marina), conservation (Alice) and habitat (David). As an example of the researcher's identification of an associated concept, when Solomon told the researcher, "The indigenous plants are protected by the laws ... which prevent all the aliens from totally controlling the whole place,"⁵ the researcher assigned the concept of control. All the children except for three (Ashleigh, Judy and Sasha) depicted associated concepts.

4.3.3.3 Individualised development of concepts through the associated concepts about the environment

There were many more associated concepts about the environment (27) than dominant concepts about the environment (19).⁶ Some were not depicted as dominant concepts (15)⁷, such as control of alien invasive vegetation. Other associated concepts were the same as dominant concepts (12).⁸ The wide variety of associated concepts extended and enriched the depiction of dominant concepts, demonstrating further individualised development of concepts for each child.

In most instances, the children varied the associated concepts about the environment (52 of the 69 instances of associated concepts were qualified as ascertained from their words of explanation). As an example, the associated concept of the care of nature (in the sense of physically looking after nature) was depicted with the following variations: care of flowers (Jodie), care of nature (Alice), care of nature with its plants

¹ Marina, Michelle, Savannah, Shahied and Susan.

² Alice, Charles, David, Jodie, Julian, Lindi and Nicholas.

³ Carey, David, Julian, Nicholas, Solomon and Tao.

⁴ Charles, Iqra, Lindi, Nicholas and Solomon.

⁵ Interview after returning the artwork, 16/07/04.

⁶ Appendix 3.

⁷ Ibid.

⁸ Ibid.

(Nicholas), care of plants (Julian) and care of indigenous plants (David). Jodie wrote, "But we have most of this beauty from the flower's, we need to take care of these flower's and make the world colourful ... You should be happy with our world and make it wonderful. So take care of those flower's and make them meny."¹ Jodie had made three flowers with roots and a bush of flowers in her artwork.²

The development of concepts in the artworks from the variation of the associated concepts is demonstrated by examples where the artworks show the same dominant concept. The concept of the threat of invasive alien vegetation to indigenous vegetation was depicted in an individualised way by eight children,³ not only in terms of visual representation, but in terms of the associated concepts.

The associated concepts contributed to each child's individualised development and depiction of the dominant concept. These associated concepts include the following: the extinction of indigenous plants (Rebecca); the protection of indigenous plants (Iqra); discrimination between threatening and non-threatening alien vegetation and the variety of indigenous plants (Manon); the control of alien vegetation, the right of fynbos to remain and the destruction of fynbos by building (Carey); the question of their possible co-existence (Melissa); and the regulation of alien plants, the protection of indigenous plants; and the variety of plants (Solomon). David also had the largest number of associated concepts of the workshop participants.⁴ Iqra told the researcher: "It's about the battle between aliens and the fynbos and indigenous plants... This is the aliens which are coming and this is the fence that protects the whole nature reserve... all the feathers and the stuff is there like the soldiers to protect the nursery."⁵ Melissa represented alien and invasive plants as portraits of girls, separated by a line and a question mark. She said:

"This side is indigenous and this girl's very pretty and ... It's really nice and this side [alien invasive] is all rough and horrible ... this girl's got horns ... I put the question mark in to say ... an alien becoming an indigenous's friend -

¹ Written work, 15/07/04.

² Artwork, 15/07/04.

³ Brian, Carey, David, Iqra, Manon, Melissa, Rebecca and Solomon.

⁴ David's associated concepts comprised the following: pollution; extinction of indigenous plants; control of invasive alien plants; destruction of beauty of South Africa with its indigenous plants through invasive alien plants; destruction of habitat through invasive alien plants; care of indigenous plants; new species arising because of control of invasive alien plants; enjoyment of nature.

⁵ Interview after completing the artwork, 15/07/04.

why couldn't they be? The alien is all angry with the world ... it's hard for her to ... throw down indigenous things and to bring in the aliens ... doesn't want to be friends with this one [indigenous].”¹

Individualised development of concepts through associated concepts is evident even in the two pairs of artworks with visual similarity depicting the same dominant concepts about the environment.

Carey² and Manon³ used watercolours to the same dilution and both used the device of turning plant material into creatures. However, their artworks differed in several ways, reflected in the associated concepts. The creatures made from indigenous vegetation respond differently in the two artworks to the threat from creatures made of alien vegetation (Manon's indigenous creatures run away, while Carey's fight back). Carey's artwork included a man with an axe and a hut. Carey's associated concepts included the right of indigenous vegetation to remain and the destruction of indigenous vegetation by people for building.

The artworks of Brian⁴ and David⁵ both have a hill and a fire as well as share some aspects of their dominant and associated concepts, but they vary from each other in content and composition because of differences in the associated concepts. One of David's several associated concepts, which was not shared by Brian, was that of new species arising because of control of alien plants. He told the researcher later in the interview: “The tree has got all kinds of plants and everything because, it's like very important plants and it's like new flowers that are growing in the tree. And ja, so if we pull out invaders and everything like that then we'll have new plants too, and different.”⁶

Where several children depicted the same associated concept about the environment without individual variation, they each developed the concept individually through its manner of depiction. As an example, the associated concept of control was depicted by Carey, David, Solomon and Tao. However, they depicted the concept very

¹ Interview after completing the artwork, 15/07/04.

² Artwork, 15/04/07.

³ Artwork, 15/04/07.

⁴ Artwork, 16/07/04.

⁵ Artwork, 16/07/04.

⁶ Interview after completing the artwork, 16/07/04.

differently in visual terms. Solomon had leaves representing laws separating the alien plants and indigenous plants,¹ Carey had painted a line between her creatures representing alien plants and fynbos, Tao showed the land cleared of alien plants² and David showed what would happen if there wasn't control.³

4.3.4 Concepts as part of the nexus of art education and environmental education

4.3.4.1 Concepts in these workshops and in writings on the integrating of art and environmental education

The dominant general concepts depicted by the children at the nexus of art and environmental education about biodiversity were threat, beauty, interdependence, creation, variety and dependence. These concepts were frequently depicted in artworks done by pupils, students and professional artists on themes other than environmental topics.⁴ In these workshops they are depicted as concepts about the environment.

The concept of interdependence between people and nature is one of the philosophical underpinnings of integrating art and environmental education (Lankford 1997; Krug 2002) based on Heimlich's work (1992, citing Boulding and Senesh, 1983). Interdependence is part of what Heimlich refers to as union: humans as part of nature (1992:1). Interdependence as a concept at the nexus of art and environmental education refers to both interdependence between people and nature, as well as within nature, but with the emphasis on people (Blandy, Congdon, and Krug, 1998:230–231; Krug, 2002; and later Rosenthal, 2003:153–157). Of the concepts developed by Krug at the nexus for the purposes of teaching about interdependence (2002:189–193), those of change and time are evident in the children's dominant concepts about the environment (threats lead to change over time).

The concepts of ecology and biodiversity, with their precedents in design education (Neperud, 1995a: 235–236) and art education about place and community (Blandy and

¹ Interview after completing the artwork, 15/07/04.

² Interview after completing the artwork, 16/07/04.

³ Interview after completing the artwork, 16/07/04.

⁴ This is common knowledge to art educators and art connoisseurs.

Cowan, 1997:40; Blandy and Hoffman, 1993:24–28) are depicted as interdependence, dependence and variety in the children's artworks.

The beauty (or aesthetics with its meaning of pertaining to beauty) of nature, as a concept at the nexus of art and environmental education, is predominantly found in the discourse of art as personal response to the environment (Mantere, 1992; 1998; Mortari, 2003:117–118; Palmer, 1998:267–269; 272–273). The children expressed beauty as an idea to do with biodiversity, showing their aesthetic response to nature.

Like the dominant concepts identified here, the associated concepts in their general form are concepts depicted generally in artworks. In addition to the concepts listed above (which featured as both dominant and associated concepts about the environment), the concepts of control, protection, care, gratitude, responsibility, conservation, enjoyment, habitat and place featured as associated concepts at the nexus of art education and environmental education.

Threat and beauty were the dominant concepts depicted most often and threat the most frequent associated concept. Threat and beauty are in the foreground of the lives of South Africans, with the high crime rate and beautiful surroundings for those privileged enough to have the lifestyle to experience the beauty at times. The children at the workshop would have been exposed to both, as a preoccupation with the security of children is necessitated by the country's high, often violent, crime rate.¹ None of the children were severely disadvantaged economically and they would therefore have had opportunities to experience South Africa's natural beauty. The workshops gave them the opportunity to depict concepts on the themes of threat and beauty.

Norman depicted both threat and beauty as dominant concepts. He told the researcher: "Well, this is kind of the beauty of nature and if we destroy it we can't get it back"² He also wrote: "Nature is a wonderful and beautiful thing and yet if we do not do

¹ This comment reflects the perceptions of South Africans about the crime rate as evident in conversations, letters to the newspaper, radio phone-ins and action taken at the time of the research (2004).

² Interview after completing the artwork, 15/07/04.

anything about the fact that we are destroying it and with it us as well [sic]."¹ Four other children who depicted beauty as the dominant concept included threat as an associated concept: Marina, Shahied, Susan and Tao. Susan told the researcher, in answer to the question asking what her artwork was about: "The beauty of indigenous plants and all the animals that sits on the plants and eat the berries and stuff that come off the plant ... This is what it would really look like if there were no alien plants all over the place."²

After threat and beauty, interdependence was the next most prevalent concept to be depicted in the children's artworks as a dominant or associated concept about the environment (ten children, five of whom depicted it as an associated concept). This concept is foregrounded in writings on art and environmental education (Blandy, Congdon and Krug, 1998:230–231; Krug, 2002; and later Rosenthal, 2003:153–157).

The concepts of dominion and stewardship, together with union (interdependence), complete Heimlich's trilogy of concepts about the relationship of people to the environment (1992, citing Boulding and Senesh, 1983). These are referred to in writings on integrating art and environmental education (Lankford, 1997; Krug, 2002) and are seen in the children's artworks as the associated concepts of control, care and protection. The concept of location, one of the four concepts developed by Krug (2002:189–193) for the purposes of teaching about ecology in art education, is evident as the associated concept of place in the artworks (David and Marina). The extension of the concepts of place and community in art education includes the concept of habitat (Blandy and Cowan, 1997:41), an associated concept depicted by David.

4.3.4.2 The imaginative possibilities of concepts

Only some of the concepts that were introduced to the children in the different sections of the workshops³ were evident in the artworks.⁴ These included 15 out of 22 different concepts from the introduction in the classroom, 10 out of 21 concepts from the walk in the Garden, 2 out of 9 concepts during the video-microscope investigation,

¹ Written work, 15/07/04.

² Interview after completing the artwork, 16/07/04.

³ The sections are listed in detail in Appendix 1.

⁴ The sections are listed in detail in Appendix 1.

6 out of the 6 concepts during the showing of the pilot study artworks and 5 out of 7 during the showing of the plant material before the creation of the art. A comparison of the concepts in the artworks with all the concepts introduced to the children indicates that the children depicted concepts that were repeated and were suitable as features of an artwork with an imaginative theme such as threats to indigenous plants and the depiction of beauty. The imaginative artworks were literal or metaphoric/symbolic depictions.

Manon's metaphoric depiction is an example of an imaginative response to concepts. It shows the concepts of the threat of alien invasive vegetation to indigenous vegetation, discrimination between threatening and non-threatening alien vegetation as well as the concept of the variety of indigenous plants. The description of content evident in artwork from her record is as follows:

On the left-hand side, creatures made from mainly alien plant material as well as beeswax and pencil drawing (on a grey and brown painted background) are chasing creatures on the right-hand side made from mainly indigenous plant material (on a painted background of tones of greens). A few indigenous flowers dot the green area as well. One creature on the left-hand side is in a more stationery position. The whole surface is painted.¹

Invasive alien creatures are chasing creatures representing indigenous vegetation, while the non-invasive alien is standing still. Manon explained what the artwork was about: "Aliens chasing away the indigenous plants ... And they're all sort of scary and fierce, except that one there. You have to like keep the little diverse plants cause they are like all diverse and stuff."² The alien creature, which is not as "scary and fierce",³ is not made of alien vegetation, but the placing of it on the grey and brown background indicates that it represents alien invasive vegetation according to Manon.⁴

Artworks with literal depictions of concepts such as beauty also show an imaginative response as described in section 4.3.2.3, such as Jodie's portrayal.

¹ Appendix 2.

² Interview after completing the artwork, 15/07/04.

³ Ibid.

⁴ Ibid.

Concepts not evident in children's artworks include the repeated concepts of families of plants and of species except the latter by implication in Ashleigh's work.¹ However, children depicted the concept of variety connected to biodiversity, although not specifically about species. Variety was depicted by nine children,² with Ashleigh depicting variety in nature with its different types of plants, in an imaginary decorative depiction. These depictions of variety were present in artworks with imaginative themes of beauty, threat or interdependence as the central concept.

The concepts introduced or repeated during the Garden walk and video-microscope investigation, which were absent in the artworks, did not have imaginative appeal for the children, for example, the concepts of the water-conserving capacity of indigenous plants (many instances), usefulness of plants and the chemical processes of decomposition. All the concepts from the showing of the pilot study artworks were depicted in the artworks of the researched workshops, as they had already been incorporated imaginatively into pictures children had created.

As the art activity commenced, all the children except Andy³ immediately began to portray their chosen ideas about biodiversity. During the course of the art activity, they all relied on imagination and reflection as they worked, except for Ashleigh and Kelly, who used a poster, book and a plant on the teacher's desk for elements of their otherwise imaginative pictures.⁴ The children would pause, possibly to consider and visualise, between bouts of activity.⁵

Egan (1988:1-2; 26-28; 1992:69-74) writes about the power of imaginative and dramatic themes to engage pupils. Gallas (2003:3-6) regards imagination as central to learning. The examination of the children's choice of concepts to express in their artworks and those they chose not to express indicates that they responded to ideas for the art that stimulated their imagination.

¹ Ashleigh said in the interview: "I thought of I would do just one type of plant then it would be a bit boring." She also wrote: "My picture is about nature I used difrent things and difrent typ of things" (16/07/04).

² Ashleigh and Judy Alice, Brian, Kelly, Lindi, Lucy, Manon and Solomon

³ Andy knew what he wanted to do (an imaginary flower), but didn't have the confidence to start (transcripts from videotapes and audiotapes; researcher's notes, 15/07/04).

⁴ Interview after completing the artwork, 16/07/04 (Ashleigh and Kelly); interview when returning the artwork, 13/09/04 (Kelly).

⁵ Observations from videotapes, 15/07/04; 16/07/04.

4.4 Personal Responses Expressed about the Concepts

4.4.1 Method of identification of the personal responses expressed about the concepts

It was evident from the initial perusal of the transcripts, written scripts and artworks that the children expressed personal responses about the concepts in the artworks, even though the emphasis of the instructions had been to express an idea to do with biodiversity.¹

The researcher's identification of the personal response expressed by each child about the concepts was facilitated by having initially identified the concepts in the artworks. Almost all of the concepts had been extracted from the children's explicit statements of attitudes or feelings when the children reflected on the completed artwork during the interview and in their writing.

For all the children, the choice of concepts in the artworks and the words they used to describe them (spoken or written) were an implicit expression of personal responses to the conceptual content of the teaching.² The children's explicit expressions of personal responses about the concepts, on the other hand, were those where children used words that are descriptive of an attitude, concern and aesthetic response or are emotive when describing what their artwork represented. All 32 children expressed an explicit personal response to the concepts.

In the analysis, as with the concepts, the personal responses about the concepts expressed by the children were ascertained from the artwork, interview and written work. The researcher summed up each child's personal response in a single statement because an affective response is less abstracted than the concepts which were recorded separately.

The researcher followed the same procedures used for the concepts with regard to checking for accuracy, when identifying the personal responses to the concepts from

¹ Videotapes and audiotapes, 15/07/04; 16/07/04.

² The children brought prior knowledge and experiences to the workshop. However, all the children depicted conceptual content from the day of the workshop (Appendix 1 and Appendix 3).

the transcripts and the artworks. This included being accurate about the children's wording when compiling the statement ensuring that the statement reflected or used the children's words. Cognisance was also taken of the context of the children's words. Attention was also given to the meanings of terms used in the headings of the list of collated personal responses.¹ The same procedures used for the concepts were also followed for recording the personal responses used for the concepts in the database. An extract from Tao's database follows as an example (his personal response).² The record for the concepts he depicted precedes the record for his personal response as the extract refers to it.

Concepts depicted

Beauty of our country as represented by our national tree; threat of alien vegetation to indigenous vegetation; control of alien invasive vegetation.

Interview: "It's about that our country is beautiful but it won't be beautiful if we do not kill the aliens and take control of them ... This is our mini national tree ... Orange is also this whole entire bits like blending into each other to show the country is beautiful."

Written work: "My picture is about S.A., our country is beautiful. So I drew a picture representing our country being beautiful. The mustard is the aliens being killed and the blended colors means growth and health and the tree is our mini African tree."

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "You may not know that that's the aliens that have been cleared, but once he's told you that then that's quite clear."]

Personal response expressed about the concepts

The beauty of our country and our trees as seen in growth and health, as well as the threat of alien vegetation to indigenous vegetation and consequently the need to kill alien plants by uprooting, burning or utilising them.

Interview: As above. Also "Green and yellow is a nice colour and it's like a healthy colour. We chuck away alien trees but we leave our trees to grow ... we actually put poison on them [alien trees], pull them out, burn them. Use them for stuff."

Written work: As above. Also "... and i thought why do aleins have too come to S.A."

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "It just comes through quite clearly that he feels strongly about this. Strong colours, strong design, no little itty bitty things and all the aliens have been cleared. Which is clear and simple and it's very beautiful ... Obviously quite a forthright person."]

¹ Appendix 4.

² 16/07/04.

4.4.2 Personal responses about the dominant and associated concepts

4.4.2.1 Collating the personal responses

The name of each child was listed under the heading of the dominant concept about which the child expressed a personal response, with a description or variation where relevant. This was followed by the statement of a personal response about the dominant and associated concepts about the environment. The responses concerning the dominant concepts about the environment were grouped under a general concept for personal response. An extract from Appendix 4 follows for 16/07/04, giving Alice and Tao's personal responses about concepts:

Personal response expressed about beauty

Personal response expressed about the beauty of nature (especially our country)

Alice: The beauty of nature in our country as seen in the variety of all the plants as well as how we can keep it beautiful if we really look after it.

Tao: The beauty of our country and our trees as seen in growth and health, as well as the threat of alien vegetation to indigenous vegetation and consequently the need to kill alien plants by uprooting, burning or utilising them.

4.4.2.2 Personal responses about dominant concepts about the environment

The children expressed their personal responses about the dominant concepts previously described in this chapter (sections 4.3.2.2 and 4.3.2.3). Personal responses were expressed about the concepts of threat, beauty, interdependence, creation, variety and dependence in terms of specific concepts about the environment such as the threat of invasive alien vegetation to indigenous vegetation, the beauty of nature, especially indigenous plants and the threat of development to nature or indigenous plants.

When Manon explained what her artwork represented, she expressed an explicit personal response to the concepts she was depicting, showing strong feelings in her pro-environmental attitude: "Aliens chasing away the indigenous plants ... And they're all sort of scary and fierce, except that one there. ... Where *they* [indigenous plants] are, it's like green and stuff and then where *they* [invasive alien plants] are it changes

to brown and yucky ... You have to like keep the little diverse plants cause they are like all diverse and stuff, and the alien plants are evil, evil" [Manon's emphasis].¹

An aesthetic response to the beauty of indigenous plants is evident in Marina's artwork and the words she used to describe it: "The heading is the beauty of indigenous plants and I chose that because like the plants here in Africa and Cape Town are very beautiful."²

Julian's pro-environmental attitude and concern is also explicit. He wrote: "My pitcher show what will happen if we keep polluiting our world. The top shows the clean world and the bottem shows dirty world. I think people should take some resposablity about the world. If we keep on going like we are the world will look like this." He also wrote: "I learnt that there are plants which are endangered and I don't want anymore get endangerd."³

4.4.2.3 Differences in explicitness

The children's personal responses about concepts depicted in the artworks differed in explicitness with regards to attitudes and feelings.

The personal responses of Judy and Shahied are statements of the concepts depicted. However, feeling is shown in their aesthetic response to nature. Shahied expressed a personal response about the beauty and variety of flowers, including the parts for pollination. He said: "Lots of little flowers made like a big flower ... I put these to be like the petals ... and the surrounding I put pollen ... That's also pollen ... Those are petals. Well it's actually put to look nice".⁴

Some children were more explicit about their personal response in terms of feeling, and this resulted in additional emphasis and nuanced statements about their artwork. The researcher used their words (or words similar to theirs) when describing their

¹ Interview after completing the artwork, 15/07/04.

² Interview after completing the artwork, 16/07/04.

³ Written work, 16/07/04.

⁴ Interview after completing the artwork, 15/07/04.

personal response to the artwork (11 children).¹ Marina's explanation, quoted in the previous section (4.4.2.2), is an example of this degree of explicitness, where she used the words "very beautiful".² Another example is that of Alice, who expressed her personal response about the beauty of nature in our country as seen in the variety of all the plants and commented on how to keep nature beautiful by looking after it. She said: "It's just about the beauty of our country and how we can keep it beautiful if we look after it."³ She also wrote: "My picture is about how beautiful our country is if we look after it. How beautiful the fields, the flowers, the tree and everything if we just really look after it all."⁴ Her repetition and "just really" add to the explicitness of her personal response.

The rest of the children (19)⁵ made strongly explicit statements of their personal response in terms of feeling. Manon's words, quoted in the previous section (4.4.2.2), are an example of this degree of explicitness, where she used the words "scary and fierce", "brown and yucky" and "evil, evil".⁶ Nicholas expressed a personal response about the threat of endangered plants becoming extinct because of people picking them and about anger towards these people for the detrimental effect on the land; also the necessity of care and protection of nature with its plants and keeping it safe. He used even more explicit speech such as "we should never pick endangered plants" and "the green is for the land is angry with these people".⁷ He also wrote: "This picture represents anger for people keeping endangered plants by picking them out of their environment. We should all take care of nature. We must protect nature and keep it safe."⁸

The depiction of these explicit personal responses in terms of feelings contributes to the development of concepts. The artwork is a vehicle for each child's development of these concepts imbued with an affective personal response.

¹ Alice, Andy, Brian, Jenna, Kelly, Lindi, Lucy, Natalie, Sasha, Solomon and Susan.

² Interview after completing the artwork, 16/07/04.

³ Interview after completing the artwork, 16/07/04.

⁴ Written work, 16/07/04.

⁵ Ashleigh, Carey, Charles, David, Gregory, Iqra, Jodie, Julian, Kim, Manon, Marina, Melissa, Michelle, Nicholas, Norman, Rebecca, Savannah, Tao, and Zaitoon.

⁶ Interview after completing the artwork, 15/07/04.

⁷ Interview after completing the artwork, 16/07/04.

⁸ Written work, 16/07/04.

4.4.2.4 Variations with regard to personal responses about the concepts

The children responded to dominant and associated concepts in the artworks about the environment in individualised ways through variations. The actual wording of their responses, when explaining their artworks, formed the statements that included these variations. These statements correspond to what is evident in the artworks. For example, Manon and Marina (quoted in section 4.4.2.2 of this chapter) as well as Michelle and Nicholas (quoted in section 4.4.2.3 of this chapter) gave personal responses about the concepts, based on and evident in their artworks. The variations are listed under the personal response to the dominant concept as the statement of the personal response to dominant and associated concepts is undivided.¹

The personal responses to the concepts evident in the artworks and their explanations differ between children, even where dominant or associated concepts about the environment are the same, demonstrating the individualised development of concepts imbued with feelings.

For example, Kelly and Natalie both expressed personal responses about the dominant concept in their work of the interdependence of plants and animals. They were explicit to a small degree about their personal response in terms of feeling, resulting in additional emphasis and nuances explanations about their artwork. Natalie's personal response about the concepts on her record was that of "the beauty of the plants and animals working together to help each other through pollination, the ants as part of nature, as well as how plants need rain and sunshine."² Her repeated use of the words "help" and "need" in her explanations adds explicitness to her expression of feelings about the concepts.³ Kelly's personal response about the concepts on her record was that of "interdependence in life and nature between animals and plants as part of life (nature's variety), for example, in pollination".⁴ She said: "I did it because of nature, it shows the animals and plants all together ... There is lots of different things like birds and plants"⁵ and wrote: "My picture is about life and how plants and animals work

¹ Appendix 4.

² Appendix 2; Appendix 4.

³ Interview and written work, 16/07/04.

⁴ Appendix 2; Appendix 4.

⁵ Interview after completing the artwork, 16/07/04.

together, and how birds pollinate plants.”¹ Her phrase “My picture is about life” in relation to the artwork adds a small degree of explicitness to her expression of feelings about the concepts.

4.4.3 Personal responses expressed about the concepts as part of the nexus of art education and environmental education

4.4.3.1 Pro-environmental attitudes and sensitivity, such as concern and aesthetic appreciation of nature

The concepts identified as being at the nexus of art and environmental education (section 4.3.4.1) are enriched by being imbued with personal responses. According to the literature on the significance of the affective dimension in environmental education (section 2.2.3.1), such responses can be regarded as pro-environmental attitudes, concern and an aesthetic appreciation of nature.

All 32 children expressed pro-environmental attitudes implicitly in their choice of concepts as well as explicitly to different degrees in their choice of words (as described in section 4.4.2.3). Concern was shown by those who expressed a personal response to threat as a dominant concept (14 children)² or as an associated concept (15 children,³ nine⁴ had also expressed it as a dominant concept). An aesthetic appreciation of nature was shown by children who expressed a personal response to the beauty of nature (15 children).⁵

Lindi expressed pro-environmental attitudes in her personal response about the importance of nature as seen in the dependence of insects on plants and on natural conditions to survive, the variety of life and her love for nature and animals. She wrote: “My picture is about how much The animals need nature to live. It is also about how much the bugs love the rich juicy plumson the bush and other fruit as well as a

¹ Written work, 16/07/04.

² Brian, Carey, David, Gregory, Iqra, Jenna, Manon, Melissa, Nicholas, Norman, Rebecca, Sasha, Solomon and Zaitoon.

³ Andy, Brian, Carey, David, Gregory, Julian, Manon, Marina, Melissa, Nicholas, Rebecca, Shahied, Susan, Tao and Zaitoon.

⁴ Brian, Carey, Gregory, Julian, Manon, Melissa, Nicholas, Rebecca and Zaitoon.

⁵ Alice, David, Jenna, Jodie, Judy, Kim, Lucy, Marina, Michelle, Natalie, Norman, Savannah, Shahied, Susan and Tao.

nice leaf for lunch, the picture is also a vinity of Life. In this picture I've shown my love fo nature and animals."¹

Gregory expressed concern about the threat of extinction to plants: "It's a picture of flowers....He's killing the plants ... It's the air ... Because of the factories ... About plant extinction ... Not just him ... A very baddie [referring to the man touching the flower]".² The environmental educationalist commented when looking at the artwork:

It [the cloud] is imposing on the whole thing so he actually feels quite strongly this threat of pollution ... It's quite a minimalist picture you know, just two plants in it but it's quite symbolic I suppose. A very powerful picture. Obviously he took it quite to heart this child. ... I think he would feel quite strongly this ... fact that plants are getting extinct and that we are causing pollution."³

Lucy expressed an aesthetic appreciation of nature. She said: "It's basically just about the beauty of life. Well these are like in nature, like plants and animals like all set together. That's why it's about biodiversity" and wrote: "My picture is about the beauty of the nature. And how Animals and Plants need each other."⁴ The environmental educationalist commented:

"I see a lot of liveliness and energy here and a lot of enjoyment in portraying what she's doing, a nice bright sun and a beautiful bird and a butterfly and the indigenous plants and a variety of colours were used in the background ... It means the beauty and diversity. A lovely sense of liveliness and enjoyment in the biodiversity here."⁵

Other examples can be seen in section 4.4.2.2, which deals with the personal responses expressed about general concepts and dominant concepts about the environment.

4.4.3.2 Imaginative possibilities related to personal responses about concepts

According to Eisner (2002:236) and Efland (2002:769), a personal response to an art task is facilitated by the imagination. According to Mantere (1992; 1998) the use of imagination by pupils when teachers combine art and environmental education enables

¹ Written work, 16/07/04.

² Interview after completing the artwork, 15/07/09.

³ Interview with environmental educationalist (Wendy Hitchcock), 08/08/04.

⁴ Interview after completing the artwork, 15/07/04.

⁵ Interview with environmental educationalist (Wendy Hitchcock), 08/08/04.

a personal response about values, issues and future scenarios (Mantere, 1992; 1998). Nadaner, writing about the relationship between visual imagery, the imagination and education, suggests: "The imagination makes thought more personal and gives the individual a more authentic kind of participation in his or her environment" (1999:206).

The researcher expressed her own personal responses to the concepts to the children as she taught them at different stages in the workshops. Her responses were identified through her words that were emotive or advocatory, indicating an attitude, concern or aesthetic response.¹ As an example, the personal response to the concept of the threat of invasive alien vegetation to indigenous vegetation was identified as "feeling a threat to indigenous plants is great", identified from her words: "Blue gums, or gums, the eucalyptus generally are bad invaders."² The teacher expressed appreciation of biodiversity, particularly with regard to indigenous plants and appreciation of a region which has particular flora. She also communicated the realisation of the need or urgency for the care and protection of indigenous plants, and the feeling that there is a great threat to indigenous plants. She expressed her appreciation of beauty, the appreciation of the interdependence of plants and animals, the appreciation of usefulness of plants and the value of recycling.³

As evident from the children's artworks and their explanations, they expressed personal responses in their artworks related to most of the teacher's responses, but individualised these responses in their own artworks. The exceptions were the usefulness of plants and the value of recycling.⁴ The teacher's expression of a personal response draws attention to the concepts being explained through engaging the imagination by adding dramatic, emphatic or descriptive elements. If the concept itself can be part of an imaginative artwork, as described in section 4.3.4.2 of this chapter, the children are likely to depict the concepts in an individualised way imbued with their own personal responses.

¹ Appendix 1.

² Videotape and audiotapes, 15/07/04.

³ Appendix 1.

⁴ Appendix 1; Appendix 4.

4.5 Use of Materials

4.5.1 Introduction

Materials are an intrinsic part of creating art and their role in the process is one of the subjects discussed in the theoretical writing of art educators. Burton writes: "This ongoing dialectic between action with a material and reflection on the outcome engages thinking, feeling and sensing ... [and] offers a frame for the exercise of imagination" (2000:334). Eisner emphasises that an art medium stabilises ideas and images as well as allows for "editing" and for new ideas to emerge (2002:232).

The use of materials was one of the four concepts at the nexus of art and environmental education developed by Krug for teaching primary school pupils about interdependency (2002:191). Krug writes about the selection of materials as related to the "systemic circumstances" of the project, in other words, the relationship of the materials to the physical and conceptual context of the artwork (ibid.). Materials are used for their literal and metaphoric meanings (ibid.). One of the findings of the study exploring links between art and environmental education by Savva, Trimis and Zachariou was the importance of materials, including those from nature, as a stimulus for the artworks (2004:250, 251).

A South African programme of art for disadvantaged children uses materials from nature in one of their projects. Children collect items in the natural environment to create landscapes (Solomon and Orlek, 1996:85–87). The authors report that the children create spontaneously with the materials from nature and experience nature with all their senses (ibid.).

4.5.2 Sensory experience depicted and re-experienced

The art materials enabled the children to create objects, colour and line, using various art media as well as plant material and feathers. The artworks show sensory experience depicted, mainly from the imagination but with some observational elements as described in section 4.2.3. Visual experiences, in both the classroom and the Garden, provided stimuli for the artworks. The seeing of colours, forms, objects

and scenery prepared the children for working in the visual mode as well as being linked to the concepts taught.¹ This could have facilitated the depiction of concepts, with sensory information being the basis of imagery in thought (Nadancer, 1999:198–200). Tactile experiences in the Garden likewise prepared them for using the plant material and feathers.²

At the first workshop the researcher encouraged the children to emulate nature by filling the whole page, which resulted in 15 of the 16 children doing so.³ Solomon was the exception. He composed his artwork diagrammatically with plants, beeswax and pencil crayon on the background of the white page.⁴ At the workshop on the 16th, the children were also asked to fill the page with colour and all did so.⁵

The depiction of sensory experience in the artworks is a re-experiencing of the original sensory experience, where the children have an opportunity for a second aesthetic response to nature (Mantere, 1992; 1998; Van Boeckel, 2006b), both through what they depict and through seeing and touching the plant material and feathers.

4.5.3 Dried plants and feathers

4.5.3.1 Art materials that connect art and environmental education

Most of the children used dried plant material and feathers in the artworks (all on 15/07/04 and 11 out of 16 on 16/07/04).⁶ With the plant material and feathers being a tangible link between the art activity and the natural environment as well as to the conceptual content of the workshops, the researcher analysed the artworks in terms of the use of indigenous and alien plant material and feathers. From the initial perusal of the data, the researcher noted that the indigenous and alien plant material and feathers were used in different ways to facilitate visual representation and to depict concepts about the environment. The researcher also noted that the plant material and feathers

¹ Videotapes and audiotapes, 15/07/04; 16/07/04.

² Videotapes and audiotapes, 15/07/04; 16/07/04.

³ Videotapes and audiotapes; artwork 15/07/04.

⁴ Appendix 2.

⁵ Videotapes and audiotapes; artwork 15/07/04.

⁶ On 16/07/04 the teacher gave the option of not using plant material and feathers in their artworks (transcripts of videotapes and audiotapes, 16/07/04).

were used appropriately and imaginatively to depict concepts imbued with personal responses about the environment.

4.5.3.2 Method for counting the ways used

The ways in which indigenous and alien plant material and feathers were used in the artworks were identified through repeated examination of the artworks. The researcher counted the number of children who used indigenous and alien plant material and feathers in each identified way, as well as the number of instances of use by that group of children. If a specific instance was repeated in the same way by the same child, only one instance was counted. For example, in Lucy's artwork only one instance of "clustering to form the right shape to represent something other than itself" was counted, even though she made two similar plants with many large helichrysum flowers to represent the flower at the top.¹

4.5.3.3 Different ways plant material and feathers were used in the artworks

The researcher identified twelve different ways in which the children used plant material and feathers in their artworks to facilitate visual representation as well as to depict concepts about the environment.

In the first four ways, the use of the plant material and feathers to facilitate visual representation predominates in that its physical appearance helped portray an object or a feature of an object, such as plant material being the right shape to represent something other than itself. The example given is the simplest and most useful way of using material from nature for representation and was thus used by the largest number of children (18) in the most number of instances (73) to assist with their depictions (Table 1).

The next two ways of using the plant material both facilitated visual representation and the depiction of concepts about the environment, with neither use receiving more emphasis (Table 2): plant material representing itself as a species type; and plant material representing itself for what it is, such as a flower, but not as a specific

¹ Appendix 2.

species. The latter, being also a simple and useful way of using material from nature for representation, was used by the second highest number of children (11).

In the final six ways of using plant material and feathers, depiction of concepts about the environment predominates, with older children using metaphoric and symbolic depiction or representation, for example plant material representing a large group to which it belongs, like invasive alien vegetation (Table 3). Most children in this group (five) used the second highest number of instances in all groups (69) with the simplest and most useful device for depiction of concepts: the plant/feather represents the plant or bird of which the material is a part

Literal meanings of materials, as described by Krug (2002:191), would include those ways described in Tables 1 and 2, with metaphoric meanings including those in Table 3. All the ways of using the plant material and feathers were imaginative in the context of the artwork, as described in section 4.5.3.4 below.

Table 1: Plant material and feathers mainly to facilitate visual representation

Ways identified of using the plant material and feathers	Number of children	Number of instances in the artworks
Its shape represents something other than itself (e.g. Charles used lichen for hair and Tao used silvertree leaves for the branches of a tree).	18	73
Enhanced the material in its capacity to represent something else besides just by being the right shape through painting colour onto the dried plant material (e.g. David's artwork with a painted silvertree leaf for the trunk and painted blackwood leaves for the outside of the trunk and tree as well as branches). Note: Children painted on the dried plant material only on the 16 th , after the teacher had suggested this.	2	11
Clustered to form the right shape to represent something other than itself. (e.g. Lucy used many large helichrysum flowers to represent the flower at the top of a plant).	7	5
Literal use of a feature of the plant material. Gregory used silvertree leaves and its hairs to depict hairy legs (of the "very baddie" responsible for the extinction of plants) ¹ .	1	1

¹ Interview after completing the artwork, 15/07/04.

Table 2: Plant material and feathers to facilitate both visual representation and the depiction of concepts about the environment

Ways identified of using plant material and feathers	Number of children	Number of instances in the artworks
Represents itself as a species type (e.g. Jodie used guinea fowl feathers for the guinea fowls and Sasha used erica twigs for erica shrubs).	6	10
Represents itself but not as a species type (e.g. Norman used helichrysum flowers for flowers in the grass and Nicholas used twigs with leaves and twigs with flowers representing endangered plants).	11	23

Table 3: Plant material and feathers where depiction of concepts about the environment predominates

Ways identified of using plant material and feathers where depiction of concepts about the environment predominates	Number of children	Number of instances in the artworks
Represents the plant or bird of which the material is a part (e.g. Carey used indigenous and invasive alien plant material to represent indigenous and invasive alien plants).	5	69
Represents a large group to which it belongs in an artwork with a literal depiction (e.g. Zaitoon used helichrysum flowers to represent plants which could become endangered or extinct ¹).	2	2
Represents a large group to which it belongs in an artwork with metaphoric depiction (e.g. Melissa used invasive alien plant material to represent invasive alien plants generally as well as indigenous plant material to represent indigenous plants generally).	3 Older children only	6 groups
Represents a large group to which it belongs in an artwork with symbolic depiction (e.g. Rebecca used invasive alien plant material and indigenous plant material to represent invasive alien vegetation generally and indigenous vegetation generally).	3 Older children only	6 groups
Symbolically represents something else associated with the material (Iqra used indigenous plant material of pincushion pollen presenters, lichens, protea bracts and leucadendrum cones to represent soldiers protecting the indigenous plants inside the nursery but; Julian used alien plant material to represent the chimneys belching pollution, both threats to the environment). ²	2 Older children	4
Symbolically represents something else not associated with the plant or bird material (Iqra used guinea fowl feathers representing the people coming into the "nature reserve" ³).	1 Older child	1

4.5.3.4 Use of imagination

Imaginative use of the plant material and feathers is evident in artwork as a whole according to its type: literal, metaphoric or symbolic depictions. Literal depictions are

¹ Interview after completing the artwork. 15/07/04.

² Interview when returning the artwork. 04/09/04.

³ Interview after completing the artwork. 15/07/04.

imaginative in their creative use of materials; metaphoric and symbolic depictions are imaginative though the cognitive processes of creating symbol and metaphor (Efland, 2004:757).

In the artworks with imaginative literal depictions, plant material and feathers were used mainly for visual representation and some depiction of concepts. Plant material was used imaginatively for representation through various means, such as creating shapes (the highest number of children and instances), using a feature of the plant material; and used to represent a species or stand for a similar plant, the latter by the second highest number of children and instances (Tables 1 and 2). In artworks with a literal depiction, plant material was also used imaginatively to represent the group to which it belongs, as well as to represent the plant or bird of which it is a part, in this way adding a symbolic element to the literal depiction (Table 3).

In the artworks with metaphoric or symbolic depiction, plant material and feathers were used imaginatively mainly for concepts about the environment. The material represented the plant or bird of which the material is a part, represented a large group to which the plant material belongs in a metaphoric or symbolic depiction or symbolically represented something else either associated with the material or bearing no relation to it (Table 3).

The children used the plant material and feathers between one and four ways each. The largest number of children employed two ways (10 children out of the 27);¹ seven children used the material in three different ways;² four children used them four different ways (Judy, Kim, Lucy and Sasha); and five children used the materials in one way only.³ In using the plant material and feathers in more than one way the children demonstrated additional imagination.

Of note is Sasha's use of plant material in four different ways, mainly for the facilitation of visual representation, in that she had cerebral palsy affecting her right arm and cognitive abilities. Having the plant material available probably assisted her

¹ Andy, Caitlin, Charles, Lindi, Manon, Melissa, Nicholas, Norman and Susan.

² Ashleigh, David, Gregory, Iqra, Jodie, Julian and Shahied.

³ Brian, Jenna, Marina, Rebecca and Zaitoon.

in making a picture in that the shapes of objects could be created easily.¹ The environmental educationalist who examined the artworks commented: "I think it's quite nice to be able to have the things to use and she doesn't have to physically draw it but she can just stick it down and represent."²

Where children used the materials in more than one way (22 out of the 27 children), plant material and feathers facilitated both visual representation and depiction of concepts about the environment. The five children who used the plant material and feathers in one way only did so in ways in which depiction of concepts about the environment predominated. Marina, however, used plant material to facilitate visual representation (the right shape) but also depicted concepts about the environment.³

4.5.3.5 Use for depiction of concepts and personal responses

An analysis of the artworks, interviews and written scripts showed that all 27 children who used the indigenous and alien plant material and feathers used them appropriately and imaginatively to depict dominant and associated concepts about the environment imbued with their personal responses to the concepts. This was the case even when they used the plant material and feathers mainly to facilitate visual representation as the representation was part of the artwork as a whole.

While the children who used plant material and feathers also painted and/or drew (as well as moulded beeswax except for Nicholas and Tao), the plant material and feathers were a definite focus in their artworks for the depiction of their concepts. A possible exception is Norman's artwork about the general beauty of nature and its possible destruction, where his use of plant material for flowers in the grass and palm trees added to the beauty of his picture, but his sand, sea and bright sunset contributed

¹ In a discussion with students enrolled for the UCT Post Graduate Certificate in Education after doing the same visual arts project (12/10/04), several commented on how having the plant material provided a short cut in depiction, with their just needing to place bark down for a tree trunk or dried material for the crown, for example.

² Interview with environmental educationalist (Wendy Hitchcock), 09/08/04.

³ Even though the researcher classified Marina's use of the material predominately as being the right shape, the protea backs and male silvertree cones also depict concepts about the environment in that, to some extent, they represent themselves but not as a species type, as they are flowers (or part thereof) and they are indigenous (the material is part of a larger group).

considerably to the effect.¹ For 19 of the 27 children, the plant material and feathers were the focus in the depiction of all the dominant concepts and the associated concepts.²

The highest number of pupils used only indigenous plant material and feathers to depict concepts about biodiversity (13 children).³ Six children used indigenous and alien plant material to depict concepts about the relationship between indigenous and alien plants,⁴ while David and Iqra used only indigenous plant material (feathers as well for Iqra) to depict concepts about the relationship between indigenous and alien plants.⁵ Seven children used indigenous and alien plant material and feathers to depict concepts about biodiversity other than about the relationship between indigenous and alien plants.⁶ The alien plant material and feathers were used for their shape to depict those concepts.

For the associated concepts about the environment, most of the children (17) used the indigenous and alien plant material and feathers to depict associated concepts in a similar manner to the dominant concepts they depicted.⁷ For example, Nicholas used indigenous plant material and feathers to depict concepts about biodiversity, with regard to both the dominant concept and associated concepts. Eight pupils used indigenous and alien plant material and feathers to express associated concepts in a different manner to their use to depict dominant concepts.⁸ For example, Solomon used indigenous and alien plant material to express concepts about variety as an associated concept, in addition to using them to depict the relationship between the two types of vegetation, as the dominant concept. Some children did not depict associated concepts⁹ or did not use the plant material to do so.¹⁰

¹ Artwork, 15/07/04.

² Brian, Carey, Charles, David, Gregory, Iqra, Jenna, Jodie, Lindi, Manon, Marina, Melissa, Nicholas, Rebecca, Shahied, Solomon, Susan and Zaitoon.

³ Ashleigh, Jenna, Jodie, Judy, Kim, Marina, Nicholas, Norman, Sasha, Susan, Tao and Zaitoon.

⁴ Brian, Carey, Manon, Melissa, Rebecca and Solomon.

⁵ Iqra used beeswax to represent alien invasive vegetation. Alien plants were not represented in the artwork by David, just the effects of alien invasive plants.

⁶ Andy, Charles, Gregory, Julian, Lindi, Lucy and Shahied.

⁷ Carey, David, Gregory, Iqra, Jenna, Jodie, Lindi, Manon, Marina, Melissa, Nicholas, Rebecca, Shahied, Solomon, Susan and Zaitoon.

⁸ Brian, Charles, David, Lindi, Manon, Marina, Shahied, Solomon and Susan.

⁹ Lucy, Norman, Shahied and Kim (who had two main concepts) as well as Judy, Sasha and Ashleigh (who had no associated concepts).

¹⁰ Tao.

These varied uses of the plant material and feathers facilitated imaginative development of concepts about biodiversity. The materials not only are used by children for their imaginative depiction of concepts imbued with an affective personal response, but strengthened their ability to do so.

4.6 Conclusion

In this chapter, the categories identified through analysis of the documentary sources of the artworks about biodiversity, together with the children's verbal and written explanations, were described and discussed in detail. The four categories of types of depiction (literal/metaphoric/symbolic and imaginative/observational), concepts depicted, personal responses expressed about the concepts and the use of materials were examined separately, but linked through the interweaving themes of imagination and development of concepts about the environment imbued with a personal response. The following chapter concludes the dissertation with discussion on the findings.

CHAPTER FIVE

CONCLUSION

5.1 The Nexus of Art and Environmental Education

5.1.1 Overview

The study contributed to clarifying the nexus between art and environmental education in two workshops for children on biodiversity.

The integration of practical art and environmental education involved content and approaches from each of these areas of learning, which worked together in a synergistic way. Concepts about the environment, which were introduced to children, had the potential to evoke an affective response from them. The art education provided the opportunity for nurturing imaginative, creative and affective expression about the theme, which deepened their personalised understanding of it.

The integration in the teaching workshops was the stimulus for pictorial expression and subsequent verbal articulation on the theme of biodiversity. The art activity resulted in tangible products providing proof of environmental learning and a springboard for discussion or written reflections. The artworks and the children's explanations of their art assisted in the development of concepts about biodiversity, imbued with an affective personal response. This clarification of the nature of the nexus between art and environmental education supports the writings of Burnaford, Aprill and Weiss (2001) on the value of integrating arts into the curriculum.

5.1.2 The development of concepts imbued with an affective personal response

In the art activity, various concepts that enabled the exercise of the imagination were depicted by all the children in detail. It provided the opportunity for concepts about the environment to be developed and consolidated. The analysis shows that the dominant concept represented in each artwork was developed and strengthened with

associated concepts or other dominant concepts. All except two artworks contained more than one concept about the environment and most contained several. The research also provides evidence to indicate that concepts were individualised and developed further by the children through variations in their depiction and description of the concepts.

The children's portrayal of concepts was enriched by references contained in explicit metaphor and symbol. The development and portrayal of concepts in the artworks bear out Efland's theory (2004) about art as imaginative cognition (including the creation and depiction of metaphor and symbol), Eisner's views (2002) of art as cognition and the findings of Burnaford, Aprill and Weiss (2001) that art in an integrated curriculum promotes authentic, original and metaphoric thinking.

The children's personal responses in terms of pro-environmental attitudes, concern about threats to nature and aesthetic appreciation contributed to rich expression about biodiversity in their artworks. The children invested emotion in their artworks as demonstrated by the explicitness of feelings expressed in their oral and written explanations. The artworks and explanations about them demonstrate the nurturing of an affective personal response to a topic, theme or issue in art education, as described by Adams (1991), Burton (2000) and Eisner (2002). They also show that the fostering of an affective response is an intrinsic part of environmental education, as evident in the writings of Iozzi (1989a; 1989b), Palmer (1998) as well as Van Weelie and Wals (2002).

However, there needs to be caution with respect to the teacher imposing her feelings and attitudes on the children. In the workshops, most of the children's feelings did reflect those of the teacher, but in an individualised way. Steps to prevent undue advocacy could include a discussion on alternative views.

The analysis revealed a close relationship between the children's conceptual thinking and their affective responses, with their concepts imbued with feeling. This suggests that the development of feelings closely linked to the concepts is likely to have been strengthened by the combination of art and environmental education, supporting the assertions that integrated curriculum can enrich learning experiences. Similarly,

Bowker's study (2007) indicates that drawings after a workshop about the natural environment resulted in "holistic understanding", where the children demonstrated both cognitive and affective learning (2007:93).

There was evidence from the explanations during the interviews and in the children's writings that the images of the detailed artworks enabled them to further develop and consolidate the concepts and in particular their feelings about them, as they talked and wrote about them. Andrzejczak, Trainin and Poldberg (2005) highlighted the potential for children's artworks about nature to stimulate discussion or writing in this manner.

The theme of biodiversity, with its range of concepts with affective dimensions, gave the children the opportunity to choose those concepts for their art that lent themselves to imaginative and emotive depiction. The multifaceted theme enabled the children to create artworks about diverse concepts such as threats to the environment, the beauty of nature and the interdependence of plants and animals. Many of the concepts about biodiversity were linked to each other, which resulted in artworks depicting a complexity of concepts with the dominant idea in each artwork enriched with associated ideas.

The children first reflected on the content of the workshop on biodiversity in order to choose concepts as a subject for their art, selecting those that appealed personally to their imagination and feelings. The evidence from observation of the workshops showed that during the art activity, the children continued the process of responding through reflection, as they adjusted and added to their artworks conceptually and aesthetically through the imagination. The third opportunity for reflection took place when they talked about what they had created in their artworks. For those who developed concepts and responses about beauty, their reflection added meaning to their previous aesthetic experiences, as emphasised in theories by Mortari (2003).

This threefold process of reflection demonstrates the integration of experiences through "constructive, reflective experiences", identified by Beane as one of the four themes of curriculum integration theory (1997:4). The reflective processes in the workshop are also evidence for the use of art for personal understanding and expression about a theme or topic, as described in the writing of Burton (2000)

regarding art education, as well as that of Birt, Krug and Sheridan (1997), Mantere (1992) and Sheridan (1996; 1997) about art integrated with environmental education. A fourth stage would be critical reflection, where the pupils would step back and examine their concepts, values and feelings or those of society. Critical reflection was not included in the workshops.

The art materials provided the means for pictorial expression and a link to the sensory world of the natural environment. The inclusion of plant material and feathers enhanced the potential of the art materials as the medium for the children's depiction of their concepts and feelings about biodiversity. The plant material and feathers were used imaginatively in a variety of ways and through this strengthened the children's cognitive and affective expression. The evidence from the study validates the theories of Burton (2000), Eisner (2002) and Krug (2002) on the significance of art materials as a vehicle for representing ideas and reflective, imaginative responses. The study shows that Krug's ideas (*ibid.*) about art materials being the bearers of literal and metaphoric meanings in the work of professional environmental artists apply equally to children's artworks, in this case on biodiversity.

Both art and environmental education place an emphasis on active learning and the construction of meaning (Burnaford, Aprill and Weiss, 2001; Janse van Rensburg and Lotz-Sisitka, 2000). When art and environmental education were integrated in these workshops, an emphasis on these approaches to learning was brought to the fore through the building of each child's understanding during the active process of practical art. The choosing of a concept to depict, the creating of the artwork and the explanations were forms of active learning, involving reflection, the affective dimension and the construction of meaning. The active learning in the workshops accords with the description by Beane of integrated curriculum as the integration of knowledge through active learning experiences about issues of personal and social importance (1997:8-9).

In summation, the research provides evidence and theory for several key aspects of the integration between art and environmental education. The integration fosters active learning opportunities, beginning with the fieldwork and culminating in the art. The connection results in artworks which provide a means for reflection about biodiversity.

Through the art, the development of a conceptual understanding of varied aspects of biodiversity and of personal responses linked to biodiversity and its conservation are encouraged. The imaginative creativity of the art, the explanatory conversations with the teacher and the reflective consolidation of the writing work support these learning experiences. The integration of the two fields of education assists the furthering of the shared goals of reflection, deepening understanding of content, construction of meaning and personal investment in matters of relevance.

5.2 Recommendations

5.2.1 Application to practice

Although there are clearly limits to generalising from a single case study, there was much that was learned from the study that may be used to inform or enrich existing practice in the field.¹ An experienced facilitator could provide learners with the opportunity to develop concepts imbued with an affective personal response when conditions are similar. The conditions include using art with the same theme presented informatively, as well as with a variety of materials, including dried plant material, in workshops structured along the lines of the research.

Opportunities in non-formal education afford applications of the research, where there are a few hours available for a workshop and a suitable outdoor resource. Applications include the schools programme during the term at the site of the case study. The programme comprises themes or topics about the natural environment, using the Kirstenbosch Garden as a resource. There is one lesson plan on offer about the theme of biodiversity. The session is for learners in Grades Five or Six and involves the exploration of the concept of biodiversity through observing, classifying and sorting fynbos plants. The research could inform an additional lesson on biodiversity or enrich the present one.

¹ There are approaches to using the description and findings of a case study, where people relate the understandings reported in research to their own circumstances, as discussed in section 3.8.3.

In formal education, opportunities for the application of the research include activities to promote the Learning Outcomes and Assessment Standards of the Natural Sciences as well as Arts and Culture Learning Areas of the RNCS in the General Education and Training band for Grades 0–9. School grounds could be developed and used as a resource for the outdoor section instead of the Kirstenbosch Garden.

Skill in the use of natural and physical resources, such as plant material, is an organising principle for Grade 4 in the Arts and Culture Learning Area but is applicable to the whole of the Intermediate Phase of Grades 4 to 6 (Department of Education, 2002b:8). The collages with dried plant material could be used towards the attainment of the Grade 4 Assessment Standard (AS), “Makes masks and crafts, costumes, collages or puppets using natural, waste or found materials” for the Learning Outcome (LO), “The learner will be able to create, interpret and present work in each of the art forms” (2002b:46). The teacher can highlight selected ways of using the plant material from the twelve ways identified by the researcher (section 4.5.3.3) to develop visual art skills in depicting environmental concepts. The Learning Area Statement also includes as purposes the use of symbolic language in art (2002b:4) as well as the development of concepts and a personal response to themes or topics as they “explore, experience and express thoughts, ideas and concepts” and “give expression to their feelings and understandings” (2002b:6).

The LO and AS described above can be integrated with those from the Natural Sciences Learning area. The Natural Sciences I.O., “The learner will know and be able to interpret and apply scientific, technological and environmental knowledge” includes the learners transforming information from one form to another, interpreting information from pictures and explaining information in their own words (Department of Education, 2002c:9–10). A specific AS for the aspect of interpreting information of this I.O at Grade 6 level is, “Learner, at the minimum, interprets information by using alternative forms of the same information” (2002c:18). The attainment of this I.O and AS can be promoted by teaching in the manner of the workshop, using collages from plant material. This can assist in achieving Arts and Culture objectives. One of four main content areas of the Natural Sciences Learning Area is ‘Life and Living’, which focuses “on understanding balance and change in environments, and on the importance of biodiversity” (2002c:61).

Funds can be allocated for the training of teachers in art education to assist with achieving successful integration with Natural Sciences and other Learning Areas, as suggested by Cowan (2008). This will help to alleviate the poor skills levels of teachers in practical art in the Intermediate Phase, as well as help to educate children about environmental issues.

The researcher's workshops can be extended in future to incorporate reflections on the artworks that were part of the research process. In this way, the children's conceptual knowledge and affective responses can be consolidated and extended through personal interaction with the teacher or an assistant, and written work.

5.2.2 Further research

The current research was limited because of the scope of the dissertation. Future research could centre on theory development, as described below, using additional data, which are available from the workshops and from other cases.

Research might include exploring the learning experiences of the children in the workshops in more detail in relation to constructivist and cognitive theories, for the purpose of theory development about the integration of art and environmental education. This could be achieved through analysing connections between the artworks and other data, such as the content of the teaching and the questionnaires that provide background information about the children.

The inclusion of data on children who have attended multiple workshops on different themes or topics about the natural environment (using other art media) could extend the study. Such research would provide further insight into the possibilities of using different themes or topics for conceptual development through imagination and emotional investment. In addition, the study would aim for an understanding of the extent to which different art techniques and materials facilitate these outcomes, extending the use of plant material to combinations with other art media. This would result in the development of theory on the integration of practical art and education about the natural environment.

Focusing the lens on other teachers and sites of practice, research can be conducted on biodiversity with multiple cases and participants of differing demographic profiles. The use of different contexts for teaching about biodiversity and the children's responses to these contexts in terms of concepts and feelings through art would be studied. Resources such as the school grounds, green belts and public open spaces in urban areas, as well as environments surrounding rural schools could be used.

The benefits of the approach of using art to teach children about biodiversity could be researched with respect to art's facilitation of expression where learners' language literacy levels are poor. Workshops facilitated by educators with less experience or limited vocabulary for biodiversity could be studied in terms of achieving conceptual development and affective responses to the theme through the use of imagination.

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APPENDICES

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Appendix 1

CONTENT OF THE TEACHING: CONCEPTS INTRODUCED AND THE TEACHER'S PERSONAL RESPONSES ABOUT CONCEPTS

The transcripts of videotapes and supplementary audiotapes provided the data for teaching sections of the workshop. The concepts introduced¹ and repeated, as well as the teacher's explicit personal responses about concepts are given for each section of the workshop. The latter are were identified through her words which which were emotive or advocatory, indicating an attitude, concern or aesthetic response. For example:

- Feeling a threat to indigenous plants is great: "Blue gums, or gums, the eucalyptus generally are **bad** invaders"².

15th July 2004

Introduction to the theme in the classroom

Concepts

Introduced (in order)

- Biodiversity (variety of plants, animals and insects)
- Region (Cape Floral Kingdom)
- Biodiversity in the variety of plants in Cape Floral Kingdom
- Variety and endangerment (hotspot)
- Protection of plants in the hotspot (Cape Floral Kingdom)
- Care for plants in the hotspot
- Responsibility for plants in the hotspot
- Extinction (general definition)
- Endangered plants (species in the Cape Floral Kingdom)
- The threat of pollution to plants
- The threat of development (building) to plants
- The threat of poaching to plants
- The threat of development (farming) to plants
- Management/regulation: builders and farmers need to apply in areas where plants especially endangered
- Threat of invasive alien vegetation to indigenous vegetation: species from Australia: reasons (spreading and taking over the land)
- Not all alien plants are a threat

¹ In the context of this appendix, "introduced" means presented to the children for the first time in this workshop.

² Videotape and audiotapes 15/07/04.

- Families and groups (genera) of plants (with brief visual demonstrations of proteas, cone bush, silvertree leaves, cones, ericas, buchu plants and pincushions); explanation of families and group of plants (using human families as a metaphor) with details about the protea family
- Species of plants (explanation using individuals in a family as a metaphor)
- Protection (with regard to the protea family)
- Pollination (of erica species by insects, birds and bees)

Teacher's personal responses about concepts

Introduced

- Appreciation of biodiversity, particularly indigenous plants [two instances]
- Appreciation of a region which has a particular flora [one instance]
- Feeling the need or urgency for care and protection of indigenous plants [three instances]
- Feeling a threat to indigenous plants is great [two instances]

Walk in the Garden

Concepts

Introduced

- Plant adaptation (reason for biodiversity/number of species) at the aloe in the Education Garden
- Conservation through propagating endangered species (Erica Verticillata)
- Botanical (Latin) names for plants with description in the species name
- Common names for plants (cobra lily because of its shape)
- Chemical processes of decomposition (at the compost heap)
- Usefulness of plants (Aloe Ferox for skin treatments, yellowwood for furniture)
- Water conserving capacity of most indigenous plants, except forest plants
- Common species (of Cape Peninsula: reeds, chasmanthe, blombos, cone bushes)

Repeated

- Families of plants (strelitzia, using two species of wild bananas and two species of crane flowers)
- Region (at the aloe in the Education Garden when discussing plant adaptation; at Waterwise Garden; at Peninsula Garden)
- Species and their differences (using aloes in Education Garden, at display cabinet and in main Garden; using cone bushes, reeds, ericas, buchu at display cabinet)
- Interdependence through pollination (bees visiting the aloes, insects visiting ericas)
- Extinction (at the Garden of Extinction)
- Endangered plants (at the Garden of Extinction)
- Threat of building to plants (at the Garden of Extinction)
- Threat of invasive alien vegetation to plants (at the Garden of Extinction)
- Threat of farming to plants (at the Garden of Extinction)
- Biodiversity/variety (strelitzias, display cabinet, aloe section, Garden of Extinction, Water-wise Garden, Peninsula Garden; the overall scope of the Garden visit)

Teacher's personal responses about concepts

Introduced

- Appreciation of beauty [four instances]
- Appreciation of usefulness [one instance]
- Valuing of items from nature [one instance]

Repeated

- Need or urgency for care and protection of plants [one instance]

Video-microscope examination

Concepts

Introduced

- Composite flowers (daisy)

Repeated

- Pollination (flower of buchu plant, daisy and the insect which crawled out of it)
- Water conserving capacity of indigenous plants (curled leaves of crica; hairs on silver tree leaf, peppermint pelargonium and unidentified flower; glands in protea leaf)

Teacher's personal responses about concepts

Repeated

- Appreciation of beauty¹ [one instance]

Introduction to the creating of visual art: preparing the board

Concepts

Introduced

- Recycling/reusing (reusing the boards which could not be recycled in the usual way because of overprinting)
- Waste reduction explicit (not wasting the glue stick unnecessarily)

Teacher's personal responses about concepts

Introduced

- Value of recycling [one instance]

Introduction to the creating of visual art: showing examples of artworks from the pilot study²

Concepts

Introduced

- Beauty¹ (in the variety of plants, animals and insects)

¹ Beauty was introduced to the children as a concept which could be depicted in an artwork during the showing of pilot study (15/07/04 and 16/07/04).

² The pilot study artworks shown do not have any visual resemblance to the artworks produced on 15/07/04, except perhaps with one of the pilot study artworks which has, amongst other flowers, a larger composite flower with petals not touching the central part which is hollow. Shahied also has a composite flower with petals not touching the central part but which is not hollow.

Repeated

- Variety (of plants, animals and insects)
- Adaptation (the creation of new species)
- The threat of invasive alien vegetation to indigenous vegetation
- Interdependence (of insects eating birds or plants; insects living in plants) [no allusion to pollination]

Teacher's personal responses about concepts

Introduced

- Care about interdependence of plants and insects [one instance]

Introduction to the creating of visual art: showing plant material

Concepts

Introduced

- Control (in connection with Category 2 of the Conservation of Agricultural Resources Act [CARA])

Repeated

- Regulation through the three CARA categories (for example not being allowed to grow Category 1 invaders)
- Usefulness of plants (wattle can be used for wood)
- Not all aliens are invasive
- Plant adaptation to different conditions (the creation of new species)

Teacher's personal responses about concepts

Repeated

- Appreciation of beauty [one instance]
- Feeling the need or urgency for care and protection of indigenous plants [one instance]
- Feeling a threat to indigenous plants is great [two instances]

Creating visual art

Concepts

Links back to previous sections

- Indigenous and invasive alien plants (the teacher pointed out that all the plant and bird materials are indigenous, except for one row that has a notice in it which says "alien")
- Biodiversity and threats to plants (people are part of biodiversity, but can be a threat to it)
- Biodiversity (biodiversity not only about the plants but also about the birds and insects)

¹ Beauty was introduced here explicitly as a concept for the first time. The teacher had expressed appreciation of beauty beforehand in the workshop.

Teacher's personal responses about concepts

Links back to previous sections

- Appreciation of beauty (of nature as depicted in the artworks)[one instance]
- Culpability of people who cause threats [one instance]

16TH JULY 2004

Introduction to the theme in the classroom

Concepts

Introduced (in order)

- Biodiversity (variety of plants, animals and insects)
- Plant adaptation (reason for biodiversity/number of species) [not introduced on 15/07/04 at this point, but later]
- Conservation (World Heritage Site) [not introduced on 15/07/04 at this point; but later on 15/07/04 in terms of propagation of endangered species (not in terms of proclaimed area)]
- Region
- Species of plants (varieties of plants: numbers in different areas)
- Biodiversity in the variety of plants in Cape Floral Kingdom
- Extinction (general definition)
- Care for plants that might become extinct
- Variety and endangerment (hotspot)
- Protection of plants in the hotspot (Cape Floral Kingdom)
- Responsibility for plants in the hotspot
- Endangerment (of species in the Cape Floral Kingdom)
- Threat of fire being too hot because of alien invaders [not introduced on 15/07/04]
- Threat of alien vegetation to indigenous vegetation (general threat)
- Threat of pollution
- Threat of picking and pulling out plants [15/07/04: poaching]
- Threat of development (farming)
- Threat of development (building)
- Management/regulation (laws in place to protect against threats) [15/07/04: builders and farmers need to apply in area where plants especially endangered]
- Protection (given laws with regard to plants)
- [*Introduced on 15/07/04 but not on 16/07/04 at this point, but later: Danger of invasive alien vegetation: species from Australia, reasons (spreading and taking over the land)]
- [*Introduced on 15/07/04 but not on 16/07/04 at this point, but later: Not all alien plants are a threat.]
- Families and groups (genera) of plants in fynbos (with brief visual demonstrations of proteas, cone bush, featherhead, silvertree leaves on branch, ericas and buchu plants)
- [*Introduced on 15/07/04 but not on 16/07/04 at this point, but later: Pollination]

Teacher's personal responses about concepts

Introduced

- Appreciation of biodiversity, particularly indigenous plants [one instance]
- Appreciation of a region which has particular flora which has the flora [one instance]
- Feeling the need or urgency for care and protection of indigenous plants [four instances]
- Feeling a threat to indigenous vegetation is great [one instance]

Walk in the Garden

Concepts

Introduced

- Species and their differences (using aloes, ericas, proteas, cone bushes, pinecushions, reeds at display cabinet; aloes in main Garden; birds and insects during aloe count in Garden)
- Common species of Cape Peninsula (such as cone bushes)
- Common names for plants (cobra lily because of its shape)

Repeated

- Families of plants (strelitzia, using two species of wild bananas and two species of crane flowers; protea family with proteas, cone bushes, pinecushions at the display cabinet; families at the Waterwise Garden and Garden of Extinction)
- Local region (at Mandela's Gold strelitzia when discussing plant adaptation; at Peninsula Garden)
- Plant adaptation/creation of new species (reason for biodiversity/number of species) after explaining Mandela's Gold strelitzia
- Extinction (at the Garden of Extinction)
- Endangerment
- Conservation through propagating endangered species (*Erica Verticillata*)
- Threat of invasive alien vegetation to indigenous vegetation
- Threat of farming to plants (at the Garden of Extinction)
- Biodiversity/variety (strelitzias, listening to the birds, display cabinet, aloe section, Garden of Extinction, Water-wise Garden, Peninsula Garden; implicit in the overall scope of the Garden visit)

Teacher's personal responses about concepts

Repeated

- Feeling the need or urgency of care and protection of plants [one instance]

Introduced

- Appreciation of beauty [two instances, one of which is linked with the threat to the plant]
- Appreciation of usefulness [one instance, only implied that the hard wood of the yellowwood is useful]
- Appreciation of the interdependence between plants and insects as seen in pollination [one instance]

- Need or urgency for care and protection of plants [one instance, only implied that care needs to be taken with the plants when picking specimens for the video-microscope]

Video-microscope examination

Concepts

Introduced

- Water conserving capacity of indigenous plants (hairs on silvertree leaf and peppermint pelargonium; glands in protea leaf; tough leatheriness of leaves of protea; thick fleshy leaves); glands and tough leatheriness of leaves of wild rosemary; waxiness of plants e.g. pincushion pollen presenter, probably more to do with pollination than moisture loss in this case; orange colour of aloe tip reflects the sun; glands on the aloe leaf; curled leaves of erica; small leaves of blombos; tough leaves, hairs and glands of buchhu plant)
- Composite flowers (two daisy specimens)
- Usefulness of plants, previously only implied in connection with yellowwood (gel in aloe leaf)
- Parallel leaf veins (only briefly mentioned)

Repeated

- Families of plants and their species (silver tree is a cone bush, part of the protea family; flower from the pea family)
- Adaptation to natural conditions (protea leaf)

Teacher's personal responses about concepts

Repeated

- Appreciation of beauty [five instances]

Introduction to the creating of visual art: preparing the board

Concepts

Introduced

- Recycling/reusing (reusing the boards which could not be recycled in the usual way because of overprinting)
- Waste reduction explicit (not wasting the glue stick unnecessarily)

Teacher's personal responses about concepts

Introduced

- Value of recycling [one instance]

Introduction to the creating of visual art: showing examples of artworks from the pilot study¹

Concepts

Introduced

- Beauty (in the variety of plants, animals and insects)

Repeated

- Variety (of plants, animals and insects)
- Adaptation (the creation of new species)
- The threat of invasive alien vegetation to indigenous vegetation
- Interdependence of insects, birds and plants (no allusion to pollination)
- Building (development) as a threat to plants

Teacher's personal responses about concepts

- Appreciation of beauty [two instances]

Introduction to the creating of visual art: showing plant material

Concepts

Introduced

- Control (in connection with Category 2 of CARA)
- Not all aliens are invasive

Repeated

- Families of plants (cone bushes being part of the protea family)
- Regulation (the three categories of invasive alien vegetation)
- Usefulness of plants (wattle can be used for wood)

Teacher's personal responses about concepts

Repeated

- Feeling the need or urgency for care and protection of indigenous plants (one instance)

Creating visual art

Concepts

Introduced

- Responsible processing of natural materials (making modelling beeswax non-toxic)

Links back to previous sections

- Indigenous and invasive alien plants (how that which is alien in one country is indigenous to another)

¹The pilot study artworks shown do not have any visual resemblance to the artworks produced on 16/07/04.

Teacher's personal responses about concepts

Links back to previous sections

- Appreciation of beauty (of nature as depicted in the artworks)[one instance]

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Appendix 2

ANALYSIS OF EACH CHILD'S ARTWORK IN CONJUNCTION WITH THE INTERVIEW AND WRITTEN WORK WHERE THE CHILD EXPLAINED WHAT THE ARTWORK WAS ABOUT (15 & 16 JULY 2004)

- The data from the 15th and 16th of July is merged in alphabetical order of the children's changed names (a white strip covers the original name on the artwork).
- For each child the artwork is shown.
- Directly below the artwork is a summary of what is evident in it and the child's explanation.
- The record of the analysis follows:
 - (i) Description of the visual content evident in the artwork which forms the basis for the analysis.
 - (ii) Types of depiction (literal/metaphoric/symbolic depiction with subtype; imaginative/observational depiction).
 - (iii) Concepts depicted (ascertained from artwork in conjunction with the interview and written work where the child explained what the artwork was about).
 - (iv) Personal responses expressed about the concepts (ascertained from the artwork, interview and written work).
 - (v) Use of indigenous/alien plant material and feathers.
- The analysis includes comments from Wendy Hitchcock (botanist, environmental educationalist and artist), regarding the children's concepts and personal responses about concepts. The educationalist's comments are not included in the description of each child's concepts and personal responses to the concepts which are derived only from the child's artwork, interview and written work.
- Additional information about the child, where particularly noteworthy, is added next to the name.
- Alien plant material (not necessary from invasive species) represents alien invasive plants in the artworks.

ANALYSIS OF THE DATA
 FROM THE 1970 CENSUS
 AND THE 1970 CENSUS
 OF THE POPULATION
 OF THE UNITED STATES

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CHILD	WORKSHOP DATE	PAGE
Alice	16/7/2004	137
Andy	15/7/2004	139
Ashleigh	16/7/2004	141
Brian	16/7/2004	143
Carey	15/7/2004	145
Charles	15/7/2004	147
David	16/7/2004	150
Gregory	15/7/2004	153
Iqra	15/7/2004	155
Jenna	15/7/2004	157
Jodie	15/7/2004	159
Judy	16/7/2004	161
Julian	16/7/2004	163
Kelly	16/7/2004	165
Kim	15/7/2004	167
Lindi	16/7/2004	169
Lucy	15/7/2004	171
Manon	15/7/2004	173
Marina	16/7/2004	175
Melissa	15/7/2004	177
Michelle	16/7/2004	180
Natalie	16/7/2004	182
Nicholas	16/7/2004	184
Norman	15/7/2004	186
Rebecca	15/7/2004	188
Sasha	16/7/2004	190
Savannah	16/7/2004	192
Shahied	15/7/2004	194
Solomon	15/7/2004	196
Susan	16/7/2004	198
Tao	16/7/2004	200
Zaitoon	15/7/2004	202

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Alice – Grade 5; 9 Years 11 Months (Workshop 16/07/04)



Summary of what is evident in the artwork and the child's explanations

The artwork is a landscape of the countryside and shows a central tree (decorated with beeswax) in a meadow, with hills and a sunset in the background. There are painted and beeswax flowers in the meadow and on the hills. The artwork represents the beauty of our country, as seen in the variety of plants, if we look after it.

Record of analysis

Description of visual content evident in artwork

A central archetypal tree of no particular species is set in a green landscape with hills in the background and a sunset in the sky. Purple strokes and dots are scattered over the green areas. Beeswax blobs of various colours are placed on the tree as well as the green landscape. The whole surface is covered with paint.

Types of depiction

Literal depiction.

Subtype: Landscape (countryside).

Composed from the imagination.

Concepts depicted

Beauty of nature, especially plants, in our country; beauty of the variety of plants; care of nature; conservation.

Interview: "It's just about the beauty of our country and how we can keep it beautiful if we look after it."

Written work: "My picture is about how beautiful our country is if we look after it. How beautiful the fields, the flowers, the tree and everything if we just really look after it all."

[*Environmental educationalist (Wendy Hitchcock):* "She's positioned her main plant here, a big tree with lots of different coloured flowers in it, in the centre of the page. It's obviously the important one but she's also got a nice depth here with the mountains and then lots of different or maybe they're all the same kinds of plants..... Well the word difference for me, different species to me is on the way to understanding biodiversity, differences, colours, species She clearly understood what you asked her to do."]

Personal response expressed about the concepts

The beauty of nature in our country as seen in the variety of all the plants as well as how we can keep it beautiful if we look after it.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* As quoted above under "Concepts depicted".]

Use of indigenous/alien plant material and feathers

Not used

Andy – Grade 5; 11 Years 4 Months (Workshop 15/07/04)



Summary of what is evident in the artwork and the child's explanations

The artwork shows an imaginary flowering plant (made from plant material and beeswax) on a decorative background of coloured diagonal stripes. The flower represents a newly created species, one of many new species which could become extinct.

Record of analysis

Description of visual content evident in artwork

There is a large central imaginary flowering plant made up of indigenous and alien plant material and beeswax. The background is painted with diagonal stripes of strong colour with the plant as a focal point. The whole surface is covered.

Types of depiction

Literal but imaginary depiction, with decorative background.

Subtype: Imaginary flowering plant.

Composed from the imagination.

Concepts depicted

Creation of new species; extinction of some new species.

Interview: "I decided to just make up my own sort of flower.....Lots of flowers are coming more species and then they'll get extinct some."

Written work: "I made up my own flower."

[Environmental educationalist (Wendy Hitchcock), 08/08/04: "The symmetry about this one is quite interesting. Obviously this child like things to be just so and has spent

a lot of time being very careful about the creation of the species because I understand that's what he was doing, creating a new species. And obviously he's taken a lot of time choosing the colours that are pleasing to him."]

Personal response expressed about the concepts

The creation of new species and the extinction of some new species; also the joy of creating.

Interview: As quoted above under "Concepts depicted". Also: "I decided to just make up my own sort of flower.....because it's just that I like making things up.Just to make it look nice.

.....I just wanted to."

Written work: "I made up my own flower because I like making things up." Also: "I used lots of colours because I wanted to decorate my page."

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* "The process here has been quite important for him, to be allowed freedom to just do whatever he wants and it's not going to be judged. It's whatever he felt like doing. And there was a reason for doing it which was creating his own species."]

Use of indigenous/alien plant material and feathers

- Used plant material in the following ways:
 - (i) It is used for its shape to represent something other than itself (pale yellowwood leaves form part of the flower at the top of the plant; the fern and spider gum trumpet made a decorative flourish at the end of the leaves – the teacher told him he could be very free if he were making up his own flower, as recorded on the supplementary audio-tapes)
 - (ii) It represents itself but not as a species type (silvertree leaves – during the production time he told the teacher that they were the leaves, as recorded on the supplementary audio-tape).
- Used both alien and indigenous plant material
- Both alien and indigenous plant material used as the distinction was not part of the concept used. No special reason for plant material chosen as parts of plants or symbols (interview when artwork returned 16/09/04).



Summary of what is evident in the artwork and the child's explanations

The artwork is a decorative depiction with the bottom tier a garden type of scene, with a central sunbird sucking nectar from a plant with long tubes (both painted) and a tree on the left (indigenous plant material) and two flowering plants on the right (indigenous plant material and beeswax). Above the scene are dried flowers and dried flowering twigs, a flower-like cone and three different types of bark. The artwork is showing the variety in nature as seen in the different types of plants.

Record of analysis

Description of visual content evident in artwork

A central sunbird is feeding on a long-tubed plant, surrounded by different plants. To the left is a tree made from a twig and silver leaves to the right of the bird is a plant made of helichrysum plants material, a flowering plant made of beeswax (above at the top are two pieces of erica plant material, two dried helichrysum flowers and a cone from a cone bush as well as tree kinds of alien and indigenous pieces of bark). The background is filled in with blue paint, with spaces around items.

Types of depiction

Literal depiction combined with decorative depiction. Bird copied from poster, decorative picture as a whole.

Subtype: Elements of the composition placed decoratively on picture, with the bottom tier a garden scene.

Composed from the imagination.

Concepts depicted

Variety in nature with its different types of plants.

Interview: "I copied it [the nice picture of the sunbird]... and then I just decorated around [with] the things that were over there. I thought if I would just do one type of plant then it would be a bit boring."

Written work: "My picture is about nature I used difrent things and difrent typ of things."

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "A lovely variety of plants around.... She's quite clear that she knew that's what she was doing."]

Personal response expressed about the concepts

The variety in nature with its different types of plants that make a picture decorative and not boring.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* As quoted above under "Concepts depicted"]

Use of indigenous/alien plant material and feathers

- Used plant material in the following ways:
 - (i) It is used for its shape to represent something other than itself (silver leaves for branches on the tree; helichrysum twigs for leaves).
 - (ii) It clusters to form the right shape (loose helichrysum petals for a flower head).
 - (iii) It represents itself as a species type (erica, helichrysum, cone from cone bush, pine and wild banana bark).
- Used mainly indigenous plant material; except for pieces of pine bark.
- Used mainly indigenous plant material appropriately to express concept.

Brian – Grade 4; 10 Years 3 Months (Workshop 16/07/04)



Summary of what is evident in the artwork and the child's explanations

The artwork shows alien invasive vegetation on a background of blue (to represent that most alien vegetation comes from across the sea) and gardens, with a variety of indigenous plants destroyed by the alien invasive vegetation, on a background of green for grass, with the two areas divided by strips of coloured beeswax for fire. The picture represents the alien vegetation and fire coming into the gardens.

Record of analysis

Description of visual content evident in artwork

A diagonal line (made of orange, blue, red and green beeswax pieces) divides the artwork. The bottom diagonal is covered with green pastel, on which a wide variety of indigenous plant material is scattered. Fire emanates from the dividing line into the top diagonal, covered with blue paint, on which three different kinds of alien plant material is placed.

Types of depiction

Literal depiction with symbolic elements.

Subtype: Landscape (undefined).

Composed from the imagination.

Concepts depicted

Threat of alien plants and fire to the variety of indigenous plants; most alien plants comes from across the sea.

Interview: "These are the alien plants coming into the nice gardens and then they're breaking all the plants, so these plants are lying on the ground because they're dying."

And this is fire and the fire is coming into the place. The blue is for because they probably came from across the sea."

Written work: "The blue is because the alien plant are probaly from across the sea. The green is for the nice grass and the plants stuck on to it is for the dead plants."

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "A good variety of plants... He's included all your concepts – biodiversity, fire, aliens."]

Personal response expressed about the concepts

The threat of alien plants, mostly from across the sea, breaking up the variety of plants in the nice gardens as well as the threat of fire to the indigenous plants, both resulting in dead plants.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* As quoted above under "Concepts depicted". Also: "Nice strong flames coming up."]

Use of indigenous/alien plant material and feathers

- Used plant material and feathers in the following way: It represents that of which it is a part (the indigenous and alien plant material represents the indigenous and alien plants of which they are a part).
- Used both indigenous and alien plant material.
- Used indigenous and alien plant material appropriately to express a concept.

Carey – Grade 6; 11 Years 11 Months (Workshop 15/07/04)



Summary of what is evident in the artwork and the child's explanations

The artwork is a metaphoric narrative in landscape setting, showing a war between indigenous plants and alien invasive vegetation, represented by creatures made up of parts of plants and pencil drawing. The alien invasive vegetation has as an ally, on their side of the war zone, a man with his axe standing outside of his hut, as he destroys fynbos for building. The creatures representing indigenous vegetation are fighting back as there were there first. The alien invasive vegetation should be controlled.

Record of analysis

Description of visual content evident in the artwork

On the left hand side, creatures made from indigenous plant material, on a painted background of plants with sky and sun above, are fighting back at creatures made from alien vegetation on the right hand side (the greater side with bare ground, a hut and a man with an axe). There are creatures on the ground and in the sky. The two areas are divided by a zigzag. The whole surface is painted.

Types of depiction

Metaphoric depiction.

Subtype; Metaphoric narrative in a landscape setting.

Composed from the imagination.

Concepts depicted

Threat of alien vegetation to fynbos; control of alien vegetation; right of fynbos to remain; destruction of fynbos by people through building i.e. development.

Interview: "[Fynbos] fighting back. This side's ones have all the space.. the aliens..... they [fynbos] want to keep all their space, it's theirs. They [indigenous plants] aren't aliens, so the aliens must go..... Well I think that they should all like live together. They [alien invasive plants] should live on their side and not want this side. Because they [indigenous plants] were here first and they are natural in this place. They [alien invasive plants] should just stay where they are. They mustn't cause mayhem."

Written work: "In my picture, the fynbos and the alien vegetation are at war, because the aliens are trying to take over the fynbos so that the aliens can get more space, but the fynbos is fighting back because they were there first. The aliens also had humans on their side, because humans destroy fynbos to build houses and stuff."

[No comment by Wendy Hitchcock as she looked at this picture in conjunction with another and focused her comments on the way children learn from each other, yet develop ideas differently.]

Personal response expressed about the concepts

The threat of alien vegetation to the space occupied by fynbos and the need to control the chaotic spread of alien vegetation as fynbos has a right to be there as it was there first and is natural in the place; also the threat by people of destruction to fynbos through building (development).

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[No comment by Wendy Hitchcock.]

Use of indigenous/alien plant material and feathers

- Used plant material used in the following ways:
 - (i) It represents the plant of which it is a part (indigenous plant material used to represent the indigenous plants of which it is a part; alien invasive plants used to represent alien invasive plants of which it is a part).
 - (ii) It represents a larger group to which the plant or bird of which it is a part belongs, in an artwork with a metaphoric depiction (alien plant material used to represent invasive alien plants).
- Used both indigenous and alien plant material.
- Used indigenous and alien plant material appropriately to express the concept of the threat of alien invasive vegetation to indigenous vegetation.

Charles – Grade 6; 12 Years 7 Months (Workshop 15/07/04)
[Speaks quickly and confidently]



Summary of what is evident in the artwork and the child's explanations

The artwork is a symbolic portrait of a man made out of mainly indigenous plant material (except for the nose) and a feather with the spaces between the material filled in with green and yellow paint. A blue sky is painted in as background. The portrait symbolises the interdependence of people and plants/animals as well as the resulting gratitude and care we should feel towards all plants. This includes alien vegetation symbolised by the pine scales for the nose. The alien vegetation just needs to be kept under control.

Record of analysis

Description of visual content evident in artwork

The artwork shows the upper torso and head of man made from mainly indigenous plant material (excepting for the nose), with the spaces in between the plant material filled in with paint (green on the torso, yellow on the head). There is a guinea fowl

feather on the torso. Scales from alien pine cones form the nose. A blue sky is painted in as background. The whole surface is covered with paint.

Types of depiction

Symbolic artwork

Subtype: Symbolic portrait

Composed from the imagination. Charles may have observed a child at the workshop for his portrait.

Concepts depicted

Interdependence of people and plants/animals; protection of plants; gratitude towards plants; care for all plants; control.

Interview: "It's kind of saying that we wouldn't be here if it wasn't for the plants helping us, so in return we should help them survive. They're giving us air and they kind of started us off on this planet. and they provide a lot of our food. It's showing that both people and animals and plants all combined so seeing as we're combined we might as well try and help each other. even though it [the pine cone] is an alien it comes from the earth so we shouldn't try and exterminate it from the earth. We should keep it in the other continents but keep it in it's own country [sic]."

Written work: "It is about the fact that the human species would not be alive if plants hadn't helped us into existence, so I believe we should return the favour. We will always need them for food and air and in return we should help the [them] survive in a safe environment. I also added some aliens into my picture to say that though they come from another country we shouldn't show too much hostility and instead just keep them under control."

[*Environmental educationalist (Wendy Hitchcock)*, 08/08/04: "I'm fascinated with why he chose the portrayal of a person and maybe it's to do with that, that we owe life something. It's our responsibility and that's the strength that comes through, that he feels very personally responsible for putting something back. A lot of the other children have come out with beauty and plants and animals and sunsets but he is very strong with the human entity. And this is obviously a human entity and the connection between humans and plants is very clear."]

Personal response expressed about the concepts

The interdependence of people and plants/animals especially through the plants helping us and our returning the favour by keeping them safe and helping them survive, including alien vegetation by not exterminating it or showing hostility, but by control.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock)*, 08/08/04: As quoted above under "Concepts depicted". Also: "He's quite a motivated child who will be involved in a project. This one for me is very strong, yes I'll do something. He gained a lot and he felt a lot."]

Use of indigenous/alien plant material and feathers

- Mainly indigenous plant material. Purposeful inclusion of alien plant material to show care for all plants and to express concept about the control of alien vegetation.

- Used plant material and feathers in the following ways:
 - (i) It is used for its shape to represent something other than itself (lichen for hair; leucadendrum cones for eyes; wild banana pod for mouth; pine cone scales for nose; cut bark into pieces of the right shape for forehead, cheeks, chin and ears).
 - (ii) It is used symbolically to represent the larger group of which it is a part (all the plant material represents the plant kingdom; the feather represents the animal kingdom; the pine cone segments represent alien vegetation). Symbolic use ascertained from interview.
- Appropriate use of plant/bird material to express concepts.

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Summary of what is evident in the artwork and the child's explanations

The artwork is a landscape of the countryside and shows a fire that is too hot caused by alien plants (not present in the picture) which is cracking the rocks, polluting indigenous plants and taking over the area (with a tree and a shrub made from indigenous plants and a beeswax plant). This destruction of the beauty of South Africa with its indigenous plants and the habitat of animals is the reason why we must care for indigenous plants and control alien plants. The tree represents new species that will grow if we control invaders. We can enjoy plants but must not harm them.

Record of analysis

Description of visual content evident in artwork

A green and brown hill occupies the bottom right diagonal section of the artwork. In the centre on the diagonal line of the hill is a tree and flower. To the right are a tree, a plant, and rocks and to the left is a fire, indigenous plants in the fire, and rocks splitting from the heat and smoke. The sun occupies the top right hand corner. The blue sky forms the background of the top left hand corner. The whole surface is covered with painting, except for the tree and plants (plant material and beeswax).

Types of depiction

Literal depiction.

Subtype: Landscape (countryside).

Composed from the imagination.



Summary of what is evident in the artwork and the child's explanations

The artwork has a protea back as a centrepiece on a background of subtly blended bands of colour which radiate out from it. A variety of indigenous plant material and guinea fowl feathers are loosely arranged on it. The artwork is a metaphoric depiction of the beauty of the variety of plants and the interdependence of biodiversity.

Record of analysis

Description of visual content evident in artwork

There is a background of subtly blended colours radiating from the centre (yellow, blues, red, purple). A protea back is the centre piece, with a variety of other indigenous plant material as well as guinea fowl feathers radiating randomly. The whole surface covered with paint.

Types of depiction

Metaphoric depiction.

Subtype: Symmetrical pattern (loosely arranged), with items representing that of which they are a part.

Composed from the imagination.

Concepts depicted

Beauty in the variety of plants; interdependence in biodiversity.

Interview: "About how the different plants live together and about biodiversity and stuff, all work together Yes, like everything looks nice together. It doesn't have to be on its own."

Written work: "My picture is basically just about how beautiful different plants look like together."

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* "There are all these interactions in nature and the variety makes it beautiful. Very vibrant picture with lots of little bits and pieces all over the place which could be misconstrued as untidy. But in fact it comes out as beautiful."]

Personal response expressed about the concepts

How beautiful different plants look together and that there is interdependence in biodiversity.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* "There are all these interactions in nature and the variety makes it beautiful."]

Use of indigenous/alien plant material and feathers

- Used plant material and feathers in following way: It represents the plant or bird of which it is a part.
- Used plant material and feathers to express a concept metaphorically.
- Used only indigenous plant material and feathers.

Jodie – Grade 4; 9 Years 7 Months (Workshop 15/07/04)
[Speaks quietly, shyly and lyrically]



Summary of what is evident in the artwork and the child's explanations

The artwork shows a garden scene with shrubs, flowers, and two guinea fowl (all from indigenous material), as well as a butterfly (mainly from beeswax), painted grass, sky and sun. The artwork is about the beauty of nature, with its various interactions and dependencies between people, animals and plants. It is also about care of flowers and gratitude towards the world.

Record of analysis

Description of visual content evident in artwork

There are shrubs (made from indigenous plant material), two guinea fowls (pencil, paint and guinea fowl feathers), a butterfly (beeswax and paint) and painted grass, sky and sun. Whole surface is covered.

Types of depiction

Literal depiction.

Subtype: Landscape (garden scene).

Composed from the imagination. The guinea fowls and oxalis flowers were seen in the Garden.

Concepts depicted

Beauty of nature; dependence of people on animals; dependence of animals on plants; pollination; interdependence of people and plants; care of flowers; gratitude towards the world.

Interview: "My picture is about the beauty, our beauty of nature, where all our beautiful animals are gathered around for [pause] for our company..... It's a tree to give them shade and our [us] plant nature..... A flower for brightening up the grass..... a bird giving the sky some company and making it full of life..... That's for the bees for the pollen and that."

Written work: "My picture is about, all the beauty we have and how lucky we are to have all this. The birds making the sky full of life, the animals to keep us company. But we have most of this beauty from the flower's, we need to take care of these flower's and make the world colourful..... You should be happy with our world and make it wonderful. So take care of those flower's and make them many."

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* "She knows what the plants need, that the bees need flowers for pollen and that the birds have a specific function and things need to be brightened up and to be made beautiful. So a very clear and concise picture which is made clearer by what she thinks."]

Personal response expressed about the concepts

The beauty of nature which is ours and which we are lucky to have, including the animals which give us company, the dependence of animals on plants for shade and food, pollination and the interdependence of people and plants regarding beauty and care of flowers to make the world colourful and wonderful.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* As quoted above under "Concepts depicted".]

Use of indigenous/alien plant material and feathers

- Used plant material and feathers in the following ways:
 - (i) It clusters together to form the right shape (silvertree leaves for a bush; helichrysum flowers for a bush);
 - (ii) It represents itself as a species type (guinea fowl feathers used for the guinea fowls).
 - (iii) It represents itself but not as a species type (flowers for the oxalis in the grass).
- Only indigenous plant material used.
- Indigenous plant material used appropriately to express concepts.

Judy – Grade 4; 10 Years 1 Month (Workshop 16/07/04)
[First language is Afrikaans]



Summary of what is evident in the artwork and the child's explanations

The artwork is a landscape with one quarter sky and three quarters grass, on which are two painted bushes with dried indigenous flowers on it, a variety of dried indigenous flowers and stems with flowers, guinea fowl feathers symbolising birds, as well as a variety of small insects executed in detail (beeswax). The artwork shows the beauty of nature, as well as the variety of plants and insects.

Record of analysis

Description of visual content evident in artwork

The top quarter is blue sky and the bottom three quarters is grass on which are scattered a variety of flowers and stems with flowers, a variety of insects executed in detail in beeswax, guinea fowl feathers and two painted bushes with dried flowers on them. The whole surface is covered with paint.

Types of depiction

Literal depiction, with a symbolic reference.

Subtype: Landscape (undefined).

Composed from the imagination.

Concepts depicted

Beauty of nature; variety and number of plants and animals (insects, birds).

Interview: "What I tried to do is just like show the beauty of the plants and since there so many kinds of bugs I also just did a few bugs.....I just did feathers just to like show the birds or something.... All the different kinds of plants and their colours."

Written work: "Well my picture is about the beauty of nature. I did lots of different kinds of plants and flowers. I did lots of little bugs to there were beetles and cattipillars. I also stuck down some guinifowl feathers."

[Section where children were asked what they learned: "Well what I learnt is that there are 9000 different kinds of plants which of 7000 are indiginous and 1500 are indangered."]

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "Well this is a delightful interpretation of biodiversity with lots of variety. There aren't two things the same. I mean she's chosen the concept of the feathers as the same but ... it comes across as being very different and these bugs are just gorgeous. So she's taken a lot of care to really make them appear as bugs, they're not a flower.....It's a big landscape and there's lots of different kinds of plants and lots of different kinds of insects. And they're clearly insects to me, they're not birds or anything, they're bugs. Small creatures. So she seems to have honed in on the smallness of biodiversity rather than the big things."]

Personal response expressed about the concepts

The beauty of nature, including the large variety of plants with their colours and animals (lots of insects, birds).

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* As quoted above under "Concepts depicted". Also: "So she's taken a lot of care to really make them appear as bugs... It's very busy and she obviously enjoyed doing it."]

Use of indigenous/alien plant material and feathers

- Used plant material and feathers in the following ways:
 - (i) It represents itself but not as a species type (the flowers on the painted bushes).
 - (ii) It represents itself as a species type (the different flowers and stems with flowers on).
 - (iii) It represents the plant or bird of which it is a part (guinea fowl feathers for birds; the different flowers and stems with flowers on).
 - (iv) It represents a larger group than the bird of which it is a part belongs, in an artwork with a literal depiction containing a symbolic reference (guinea fowl feathers representing birds, as ascertained from interview).
- Used only indigenous plant material
- Used indigenous plant material appropriately to express concepts.

Julian – Grade 5; 12 Years 3 Months (Workshop 16/07/04)

[Slight learning difficulties evident in handwriting, spelling and age for grade.
Mother confirms dyslexia]



Summary of what is evident in the artwork and the child's explanations

The artwork depicts two possible future scenarios. It shows a landscape with indigenous plants, a man, the blue sky and sun with large rays in the upper third. The lower two-thirds shows a cityscape with factories spewing pollution out of chimneys (made from alien plant material) on a murky background. The upper landscape is how we would like the world to look like if we take responsibility, use the right equipment and do not destroy trees, in contrast to the bottom if we destroy trees and build more factories which cause pollution, thereby endangering plants.

Record of analysis

Description of visual content evident in artwork

The artwork is divided horizontally. The top third shows a beeswax man, grass, blue sky and yellow sun, with indigenous plant material (cones and flower head backs) on or near the base line. Three of the plant items are painted (two green and one red). The bottom two thirds shows factories spewing black pollution into the air, mainly through chimneys (painted black) of alien plant material. The rest of the background in this portion is painted in browns with some red and blue, both containing black. The whole surface is covered with paint.

Types of depiction

Literal depiction.

Subtype: Landscape (undefined) / cityscape

Composed from the imagination.

Concepts depicted

Threat of development and pollution to the world including plants; management of development and plants; endangered plants; care of plants; responsibility towards the world.

Interview: "This part here is what we want it to look like, but this is what will happen if we don't look after the nature. If we carry on chopping down trees to build more factories which make pollution and if we don't use the right sort of stuff, and use the right sort of equipment, well, this is what the world will look like. If we do use the right stuff and minimise our chopping down of the forests, this is what probably the world will look like. Later on in the interview: We must look after the plants."

Written work: "My pitcher show what will happen if we keep polluiting our world. The top shows the clean world and the bottem shows dirty world. I think people should take some resposablity about the world. If we keep on going like we are the world will look like this. ... I learnt that there are plants which are endangered and I don't want anymore get endangered."

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "It's very clear here that he's got two different possibilities, two difference scenarios of what will happen and he's got his indigenous things and it's at the top which presumably is what he wants.... It's a factory okay so he's brought in pollution and development into it as well.... A nasty pile of rubbish there it looks like and the bright sun here. It says danger."]

Personal response expressed about the concepts

The threat of destruction of trees, incorrect development and pollution to the world in the future including plants, resulting in a dirty world without plants and how we have the responsibility towards the world's future in terms of correct development and the necessity of the care of plants, minimising endangerment, resulting in a clean world with plants.

Interview: As quoted above under "Concepts depicted";

Written work: As quoted above under "Concepts depicted";

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* As quoted above under "Concepts depicted". Also "All this grey smudgy dirty... it's a very graphic picture."]

Use of indigenous/alien plant material and feathers

- Used plant material and feathers in the following ways:
 - (i) It is used for its shape to represent something other than itself (spidergum and eucalyptus seed cases to represent chimneys; plant cones and flower head backs for shrubs).
 - (ii) It is enhanced in its capacity to represent something else besides just being the right shape by painting over it with colour (plant cones and flower head backs painted yellow, green or red for shrubs; alien plant material painted black to represent chimneys).
 - (iii) It is used symbolically to represent something else associated with the plant material or feathers (the alien plant material to represent a source of threat to the environment, in this artwork for the chimneys which cause pollution)
- Used both indigenous and alien plant material.
- Used indigenous and alien plant material appropriately to express concepts.

Concepts depicted

Threat of alien invasive plants to indigenous plants through taking over land and through fire (destruction and pollution); extinction of indigenous plants; control of alien invasive vegetation; destruction of beauty of South Africa with its indigenous plants through alien invasive plants; destruction of habitat through alien invasive plants; care of indigenous plants; new species arising because of control of alien invasive plants; enjoyment of plants.

Interview: "It's just to say that you must stop. You must pull out alien plants and everything like that invades. The alien plants have made like a fire....and it's like too hot and it's been cracking all the rocks and everything.....and also it's polluting all the other plants and everything...and then that's soon going to take over the nice place that has got all of our indigenous plants and everything like that. Then there won't be such a nice South Africa anymore....So you must just pull out alien plants and not, you mustn't grow them or, even in your garden. That's indigenous plants that are getting into the fire." Later in the interview: "The tree has got all kinds of plants and everything because, it's like very important plants and it's like new flowers that are growing in the tree. And ya, so if we pull out invaders and everything like that then we'll have new plants too, and different. Also We're learning about how plants are also destroying the natural habitat and that it's taking over so much, and so many animals can die and everything."

Written work: "My picture is about learning from our plants and to destroy the alien invaders. They can destroy our whole environment. Our plants are indigenous and we must look after them. : We will make all kinds of joy with plants but we must not harm them or disturb them either....." [There is a four stage drawing of the demise of indigenous plants (aloe) after the writing work: "1. nice"; "2. no water"; "3. fire"; "4. debris".]

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "You can see the fire and the burning and the rocks cracking here and the flames and the bare mountain. The sun shining brightly in the sky. One plant there and one looking at it being burnt.aliens causing more fire."]

Personal response expressed about the concepts

The threat of alien invasive plants to indigenous plants through taking over so much land and through fire (with its destruction and pollution), leading to extinction and the destruction of beauty of South Africa and habitat, resulting in death of animals; also stopping the invaders by pulling out, destroying and not being allowed to grow them, motivated by the necessity of care of indigenous plants, enjoying them but not harming or disturbing them with important new species arising as a result

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted". [In the section on what the artwork was about: "I also did not know how much the aloe ferox produces like aloe gel for your soaps or for a face wash too. They are so special."]

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* As quoted above under "Concepts depicted": Also "He's obviously taken it quite to heart, this business of aliens causing more fire"]

Use of indigenous/alien plant material and feathers

- Used plant material and feathers in the following ways:
 - (i) It is used for its shape to represent something other than itself (painted silvertree leaf for trunk; painted blackwood leaves for outside of trunk and tree, possibly branches).
 - (ii) It is enhanced in its capacity to represent something else besides just being the right shape by painting over it with colour (painted silvertree leaf for trunk; painted blackwood leaves for outside of trunk and tree; painted blackwood leaves for branches).
 - (iii) It clusters to form the right shape (various bits of indigenous plant material for foliage and flowers of the tree; the pincushion pollen presenters for indigenous plants).
- Used only indigenous plant material.
- Used indigenous plant material appropriately to express concepts.

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Gregory – Grade 4; 10 Years 2 Months (Workshop 15/07/04)



Summary of what is evident in the artwork and the child's explanations

The artwork is about extinction and shows a man touching one of two indigenous flowers. The man is killing (possibly picking or poaching) the plants and is doing wrong. The background is the blue sky, with a huge black cloud overhead caused by the factories. The sun is in the corner.

Record of analysis

Description of visual content evident in artwork

A man made from indigenous and alien plant material touching one of two flowers, (heads are indigenous plants), with a huge black cloud overhead in the blue sky and the sun in a corner. Paint covers the whole surface.

Types of depiction

Literal depiction but one man "symbolising the extinction" (*Environmental educationalist (Wendy Hitchcock), 08/08/04*).

Subtype: Landscape (undefined).

Composed from the imagination. Plants similar to those which were seen (for example, protea).

Concepts depicted

Threat of extinction to plants from people's actions; culpability of people who cause the threat.

Interview: "It's a picture of flowers....He's killing the plants..... It's the air.....Because of the factories..... About plant extinction. Not just him. ... A very baddie." [Referring to the man touching the flower.]

Written work: "I learnt about the plants and how people poacher plants." [The man is possibly picking or poaching the flower. The researcher spoke to the children about poaching as a threat and when showing the plants, during the teaching introduction].
{*Environmental educationalist (Wendy Hitchcock), 08/08/04:* "And then you've got your one man symbolising the extinction. But he's not the only one, there's a whole lot of causes so the child obviously understands quite clearly that it's not just one man, it's a whole lot of things."}]

Personal response expressed about the concepts

The threat of extinction to plants including the threat of pollution and how bad people are who kill the plants.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

{*Environmental educationalist (Wendy Hitchcock), 08/08/04:* "It [the cloud] is imposing on the whole thing so he actually feels quite strongly this threat of pollution..... It's quite a minimalist picture you know, just two plants in it but it's quite symbolic I suppose. A very powerful picture. Obviously he took it quite to heart this child.I think he would feel quite strongly this..... fact that plants are getting extinct. And that we are causing pollution,"}].

Use of indigenous/alien plant material and feathers

- Used plant material in the following ways:
 - (i) It is used for its shape to represent something other than itself (the arms of the person "killing the plants").
 - (ii) Literal use of feature of plant material (silvertree leaf and its hairs depict hairy legs).
 - (iii) It represents itself but not as a species type (helichrysum flowers for flower heads).
- Used indigenous plant material except for spider gum - arms of poacher.
- Used indigenous and alien plant material appropriately to express concepts.

Iqra – Grade 7; 12 Years 10 Months (Workshop 15/07/04)



Summary of what is evident in the artwork and the child's explanations

The artwork is a metaphoric narrative in a landscape setting and shows a battle between alien vegetation and fynbos. It portrays a fenced nature reserve with a hut as a nursery, as well as indigenous plant material and feathers as soldiers to protect the nursery, including a soldier on a bridge over a river. Outside the fence, which is there for protection, pieces of beeswax represent the attacking alien plants.

Record of analysis

Description of visual content evident in artwork

The page has a border of indigenous reeds with brown beeswax strips on the right-hand side, outside of the border. Inside the border on the left top corner, there is a cardboard cylinder with a top made out of a protea back. It resembles a hut. In front of the cylinder, the ground is covered with mainly two types of indigenous plant material up to a river. On the other side of the river, guinea fowl feathers fill the space up to the border. A cardboard semi-circle spans the bridge, with an indigenous cone at the top. The whole surface (except for part of the border) is covered by paint.

Types of depiction

Appears literal (landscape) but is a metaphoric depiction.

Subtype: Metaphoric narrative in a landscape setting.

Composed from the imagination.

Concepts depicted

Threat of alien plants to indigenous plants; protection of indigenous plants.

Interview: "It's about the battle between aliens and the fynbos and indigenous plants.....This is the aliens which are coming and this is the fence that protects the

whole nature reserve... all the feathers and the stuff is there like the soldiers to protect the nursery."

Written work: "It's about a battle field the Fynbos fight the incoming alien plants..... the fynbos are there to protect the main nursery at the back from being attacked by the aliens the main hut/nursery is where all the special fynbos are kept safe like proteas + Reeds etc."

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* "If I just saw this and I didn't know that these pieces here are actually the aliens invading and this was a soldier here, it would just be a pretty picture to me. So the symbolisation of those things and what the meaning that child has put into these different things, that's what comes across as very important."]

Personal response expressed about the concepts

The threat of alien invasive plants to indigenous plants and the need to protect the special fynbos from being attacked by the alien plants.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* As quoted above under "Concepts depicted".]

Use of indigenous/alien plant material and feathers

- Used plant material and feathers in the following ways:
 - (i) It is used for its shape to represent something other than itself (the protea back as the roof of the indigenous nursery hut; the restios stem pieces for the protective fence).
 - (ii) It is used symbolically to represent something else associated with the plant material or feathers (the indigenous plant material of pincushion pollen presenters, lichens, protea bracts and leucadendrum cone represent soldiers to protect the indigenous plants inside the nursery hut, as ascertained from interview).
 - (iii) It is used symbolically to represent something else not associated with the plant material or feathers (the guinea fowl feathers represent the people coming into the *nature reserve* as ascertained from interview).
- Used only indigenous vegetation.
- Appropriate use of indigenous plant material (together with other art materials, such as beeswax for the alien invasive vegetation, chosen as it contrasted strongly to the indigenous plant material).



Summary of what is evident in the artwork and the child's explanations

The artwork is a landscape of the countryside, with a sunbird on a plant which is decorated with beeswax. In the background are hills with plants and a sunset. The artwork shows the interdependence of animals and plants in nature, including pollination.

Record of analysis

Description of visual content evident in artwork

A sunbird sits on a flowering plant. In the background are hills with grass and similar flowering plants, smaller because of being in the distance. An orange sun and sky fill the left top corner above the hills. Some of the sun's rays reach across the hills. The picture is painted, except for the leaves of the plants and top of the hills which are drawn in pastel. The whole surface is covered. The flower heads are drawn in pencil and painted. Four blobs of beeswax are attached to the stems of the central plant.

Types of depiction

Literal depiction.

Subtype: Landscape (countryside).

Composed from the imagination. Central plant was drawn copying the specimen on the teacher's table.

Concepts depicted

Interdependence of animals and plants in nature; pollination; variety.

Interview: "I did it because of nature, it shows the animals and plants all together. Later on in interview: There is lots of different things like birds and plants."

Written work: "My picture is about life and how plants and animals work together, and how birds pollinate plants."

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "She's got a nice variety hereShe's obviously quite an organised child and thought carefully about how she was going to do things."]

Personal response expressed about the concepts

Interdependence in life and nature between animals and plants (nature's variety), for example, in pollination.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "It's very peaceful and beautiful."]

Use of indigenous/alien plant material and feathers

Not used.

University of Cape Town

Kim – Grade 4; 9 Years 10 Months (Workshop 15/07/04)



Summary of what is evident in the artwork and the child's explanations

The artwork shows a garden type of landscape scene with a tree (from indigenous plant material, except for the bark), and two guinea fowl and butterflies (mainly of beeswax) with painted grass and sky. The artwork is about the beauty of nature, including the blended colours, and how plants and animals are supposed to live.

Record of analysis

Description of visual content evident in artwork

A central tree is made up of indigenous plant material (except for bark) with two guinea fowl (painted, with guinea fowl feathers for the body) and close by, butterflies. The rest of surface is covered in paint (grass and sky).

Types of depiction

Literal depiction.

Subtype: Landscape (garden scene).

Composed from the imagination. The guinea fowls were seen in the Garden.

Concepts depicted

Beauty of nature; plants and animals in ideal nature.

Interview: "It's the beauty of nature. It's how they grow in nature."

Written work: "My picture is about nature's beauty its so wonderful how all the colours blind in together My picture is just showing how plants and animals are sposed to live."

[Environmental educationalist (Wendy Hitchcock), 08/08/04: "This is a lovely representation where you've got all your indigenous plants represented, well it's one

tree but it's a whole variety. So you've really got the variety represented here and the animals represented symbolically by your butterflies."]

Personal response expressed about the concepts

The wonderful beauty of nature, including the blended colours, as well as how plants and animals are supposed to live.

Interview: As quoted above under "Concepts depicted"

Written work: As quoted above under "Concepts depicted". Also: "...its so wonderful how all the colours blind [blend] in together this is why my family spends so much time at the Kirsten Boesh gardens. We normally spend the whole day here." (Also, link made between visual arts and nature "- My picture is about nature's beauty its so wonderful how all the colours blind [blend] in together.")

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* As quoted above under "Concepts depicted".]

Use of indigenous/alien plant material and feathers

- Uses plant material in the following ways:
 - (i) It is used for its shape to represent something other than itself (strip of pine bark for the indigenous tree trunk; cone bush leaves for branches of tree)
 - (ii) It clusters to form the right shape to represent something other than itself (helichrysum flowers for the crown of the tree)
 - (iii) It represents itself as a species type (guinea fowl feathers used for the guinea fowl).
 - (iv) It represents itself but not as a species type (pine bark for indigenous bark).
- Only indigenous plant material and feathers except for bark of tree (Kim knew it was alien).
- Appropriate use of indigenous plant material and feathers to express concepts (alien bark of tree used because it was the right shape).



Summary of what is evident in the artwork and the child's explanations

The artwork shows a garden scene with a variety of life. There is grass and a tree, flowers (using indigenous plant material), a caterpillar going to a bush to eat leaves and plums, a squirrel, a butterfly going to a flower for nectar, as well as birds in the sky above the raining clouds to avoid getting their feathers wet (not guinea fowl even though they have guinea fowl feathers). The artwork is about her love for nature and animals.

Record of analysis

Description of visual content evident in artwork

At the bottom of the picture on a strip of grass are a bush with purple dots, a beeswax caterpillar, a tree with silvertree leaf branches and painted flower with a dried flower centre, a squirrel with feathers for a tail, and a plant made of dried erica. A butterfly hovers near the painted flower. In the blue sky are blue clouds from which rain descends. Above the clouds are three birds with guinea fowl feathers for wings. The whole surface is covered with paint except for spaces between the rain and some spaces around the separate items (and her name).

Types of depiction

Literal depiction.

Subtype: Landscape (garden scene).

Composed from the imagination.

Concepts depicted

Dependence of animals (including birds and insects) on plants and natural conditions; the self-protection of birds from rain; variety of life; love for nature and animals.

Interview: "Well it's to show how important nature is and the animals need like the water and plants that they can eat and drink and survive in nature..... It's a little caterpillar and he's going to the bush and he's going to eat some leaves.... That's a butterfly and it's going to go and land on the flower to eat some nectar..... They fly above the clouds 'cause they don't want their beautiful feathers to be wet."

Written work: "My picture is about how much The animals need nature to live. It is also about how much the bugs love the rich juicy plumson the bush and other fruit as well as a nice leaf for lunch. the picture is also a virity of Life. In this picture I've shown my love fo nature and animals."

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "This is the first time I've seen somebody portraying water so clearly. The raindrops and they're obviously quite important to her and important to the whole of nature, the water and the water cycle."]

Personal response expressed about the concepts

The importance of nature as seen in the dependence of animals (insects) on plants and on natural conditions to survive; also the need for birds of self-protection in rain, variety of life and love for nature and animals.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted". Also: "In this picture I've shown my love fo nature and animals"

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "I find it quite interesting that the birds are above the clouds.... It comes out as being concern."]

Use of indigenous/alien plant material and feathers

- Used plant material and feathers in the following ways:
 - (i) It is used for its shape to represent something other than itself (silvertree leaves for branches; dyed turkey feathers for squirrel's tail; helichrysum flower for the centre of a flower head; guinea fowl feathers for the wings of birds-not guinea fowls).
 - (ii) It represents itself but not as a species type (guinea fowl feathers for the wings of birds-not guinea fowls).
 - (iii) It represents itself as a species type (erica twig for erica shrub).
- Used only indigenous plants; both indigenous and alien feathers.
- Used indigenous/alien plant material and feathers appropriately (possibly a coincidence that alien feathers used for the alien squirrels tail).

Lucy – Grade 5; 10 Years 0 Months (Workshop 15/07/04)
[Lives in China as father is a missionary]



Summary of what is evident in the artwork and the child's explanations

The artwork shows a garden scene, with two flowers from indigenous material, a bush, a bird, a butterfly and a sun with a blended pastel background. The artwork is about the beauty of nature and animals as well as how animals as well as plants need each other.

Record of analysis

Description of visual content evident in artwork

The picture comprises of two flowers made from indigenous plant material and a feather, a butterfly (mixed alien and indigenous plant material), bird (mixed alien and indigenous feathers), sun (paint and alien plant material), bush (paint and plant material). Blended pastel covers the background (except for with outlines made around the items in the picture).

Types of depiction

Literal depiction.

Subtype: Landscape (garden scene).

Composed from the imagination. Buchu bush and guinea fowls were seen.

Concepts depicted

Beauty of nature: variety of plants and animals; interdependence of animals and plants

Interview: "It's basically just about the beauty of life. Well these are like in nature, like plants and animals like all set together. That's why it's about biodiversity."

Written work: "My picture is about the beauty of the nature. And how Animals and Plants need each other."

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* "I see a lot of liveliness and energy here and a lot of enjoyment in portraying what she's doing, a nice bright sun and a beautiful bird and a butterfly and the indigenous plants and a variety of colours were used in the background. ...It means the beauty and diversity"]

Personal response expressed about the concepts

The beauty of life as seen in nature with the interdependence of the variety of animals and plants.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* As quoted above under "Concepts depicted". Also: "A lovely sense of liveliness and enjoyment in the biodiversity here."]

Use of indigenous/alien plant material and feathers

- Used plant material in the following ways:
 - (i) It is used for its shape to represent something other than itself (eucalyptus leaf, pine cone segment, spidergum trumpet and bol-bol head for butterfly; silvertree leaves for stems; guinea fowl feather for a leaf; fern fronds for leaves; spidergum trumpet for rays of the sun).
 - (ii) It clusters to form the right shape to represent something other than itself (many large helichrysum flowers to represent the flower at the top of a plant)
 - (iii) It represents itself as a species type (guinea fowl feathers used for the guinea fowl).
 - (iv) It represents itself but not as a species type (small helichrysum flowers represent buchu flowers; turkey feathers used for the guinea fowl tail; many large helichrysum flowers cluster together to represent the flower at the top of a plant);
- Used both alien and indigenous plant material and feathers: indigenous plant material and feathers for depiction of the plants; alien plant material for the sun's rays; use of both for the butterfly and the guinea fowl for reasons given above.
- Concepts depicted were not to do with alien invasive versus indigenous vegetation.



Summary of what is evident in the artwork and the child's explanations

The artwork is a metaphoric narrative in a landscape setting and shows alien plants chasing away indigenous plants. The plants are in the form of creatures made up mainly of the plant material they are representing. The frightening alien creatures are on a muddy brown background and the diverse indigenous vegetation on a green, fertile background. As not all alien vegetation is threatening, one creature on the alien side is not so fierce.

Record of analysis

Description of visual content evident in artwork

On the left-hand side, creatures made from mainly alien plant material as well as beeswax and pencil drawing (on a grey and brown painted background) are chasing creatures on the right-hand side made from mainly indigenous plant material (on a painted background of tones of greens). A few indigenous flowers dot the green area as well. One creature on the left-hand side is in a more stationery position. The whole surface is painted.

Types of depiction

Metaphoric depiction.

Subtype: Metaphoric narrative in a landscape setting.

Composed from the imagination.

Concepts depicted

Threat of alien vegetation to indigenous plants; discrimination between threatening and non-threatening alien vegetation.

Interview: "Aliens chasing away the indigenous plantsAnd they're all sort of scary and fierce, except that one there. You have to like keep the little diverse plants cause they are like all diverse and stuff."

Written work: "The alien vegetation is supposed to look all destructive and scary because it's chasing the pretty, indigenous plants away...not all aliens are very threatening". (Manon made one alien creature not so "scary and fierce".)

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* "What I like about this one is that the aliens are flying in. And the indigenous plants seem to be running away. They seem to be kind of taking over."]

Personal response expressed about the concepts

The threat of the destructive, frightening and harmful alien vegetation to the pretty indigenous plants; also that not all alien plants are a threat, as well as the inherent value of the variety of indigenous plants.

Interview: As quoted above under "Concepts depicted". Also "Where they [Manon's emphasis] are, it's like green and stuff and then where they are it changes to brown and yucky. You have to like keep the little diverse plants cause they are like all diverse and stuff, and the alien plants are evil, evil."

Written work: Also "Wherever the indigenous plants are, it's green and fertile, and vice-versa to the aliens."

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* As quoted above under "Concepts depicted".]

Use of indigenous/alien plant material and feathers

- Used plant material in the following ways:
 - (i) It is used for its shape to represent something other than itself (the alien and indigenous plant material is broken, torn, cut or used as found to form part of a creature with all creatures made up of more than one piece).
 - (ii) It represents a larger group to which the plant or bird of which it is a part belongs, in an artwork with a metaphoric depiction (alien and alien invasive plant material used to represent invasive alien plants generally; indigenous plant material to represent indigenous plants generally).
- Both indigenous and alien plant material used
- Indigenous/alien plant materials used appropriately to express the concept, but the creatures are not all made solely of the vegetation type they are representing. One alien creature has indigenous twigs for the body and legs. In the interview, Manon said "I tried making the alien plants with as much alien stuff as possible." One indigenous creature has an alien plant's bark for its body and arms. The alien creature which is not as "scary and fierce" is not made of alien vegetation. The placing on the painted background indicates whether it represents alien invasive or indigenous vegetation according to Manon (different colour backgrounds). She had also thought of making particular plants but was limited by the materials: "I first thought I was going to make them all particular plants but then I didn't have enough grey things."



Summary of what is evident in the artwork and the child's explanations

The artwork shows a garden scene with a heading above it in the top third, "The beauty of indigenous plants". The garden consists of beeswax with indigenous plant material as flower heads. Close to the plants are a beeswax bird, bee for pollination and a butterfly. In the painted blue sky in the background is a beeswax sun which enables the plants' growth. There are only three flowers because the others have been destroyed by alien plants which used up all their water.

Record of analysis

Description of visual content evident in artwork

Three plants with beeswax stems, beeswax and painted leaves and flower heads (from plant material) rise up from the grass (paint and beeswax), with crow, bee and butterfly (from beeswax, flying nearby). A beeswax sun is placed in the corner of the blue sky in the background. At the top is a yellow strip with a wavy base in which is written (in pencil filled in with a different colour paint for each word): "THE BEAUTY OF INDIGENOUS PLANTS". The whole surface is covered with paint.

Types of depiction

Literal depiction.

Subtype: Landscape (garden scene).

Composed from the imagination.

Concepts depicted

Beauty of indigenous plants in Cape Town and Africa; threat of alien invasive vegetation to indigenous vegetation; extinction; pollination: dependence of plants on natural conditions.

Interview: "The heading is the beauty of indigous plants and I chose that because like the plants here in Africa and Cape Town are very beautiful and like alien invader plants, they're actually like wiping out most of the indigous plants." Repeated later in the interview when asked how it fits in with the theme of biodiversity, meaning variety: "Well, this is the beauty, like the beauty of plants, and as well like alien plants, how they can take some of the indigous plants away...that's why I did so few plants. Only three, because there were lots of them here but then alien plants just like used up all their water and that so they died. And they're gone." Also: "If there was no sun nothing would growIt's [the bee] taking pollen or nectar from the other plants...It spreads seeds."

Written work: "MY PICTURE IS ABOUT HOW ALIEN PLANTS CAN DESTROY INDIGIOUS PLANTS AND HOW BEAUTIFUL INDIGIOUS PLANTS ARE."

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "Here we have a very beautiful interpretation of our indigenous flora, very stark and striking.....She said this was the space where the aliens were..... that was obviously important to her that she had considered the aliens, but it doesn't come through very clearly in the picture. Just the beauty and the patterns, I think she's chosen nicely the plants to use. She's chosen something that looks like a daisy here and the protea flower there. And the leaves of the silver tree are really beautiful."]

Personal response expressed about the concepts

How very beautiful indigenous plants in Cape Town and Africa are, as well as the alien invasive plants destroying and wiping out indigenous plants, pollination and dependence of plants on natural conditions.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* As quoted above under "Concepts depicted"]

Use of indigenous/alien plant material and feathers

- Used plant material in the following way: It is used for its shape to represent something other than itself (protea backs and male silvertree cones for whole flower heads).
- Used only indigenous plant material.
- Used indigenous plant material appropriately to express the concept the beauty of indigenous plants.



Summary of what is evident in the artwork and the child's explanations

The artwork comprises of metaphoric portraits of two girls, the one representing indigenous plants and the other alien plants, on either side of a beeswax dividing line which has a question mark in the middle to represent asking whether they could be friends (that is, co-exist). The indigenous girl is smiling, has golden beeswax curls in her hair and is surrounded by indigenous plants, all on a light pink background representing lightness of attitude to the world. The alien girl has a down-turned mouth, horns on her head with smoke coming out of them, untidy hair with alien plant material being used (except for the hair), all on a red background, representing anger with the world.

Record of analysis

Description of visual content evident in artwork

The faces of two girls are on either side of a beeswax dividing line with a question mark in the middle. On the left-hand side there is a smiling girl (drawn and painted) with golden beeswax curls and bows and other indigenous plants on a pink painted background. On the right-hand side, there is a girl with down-turned mouth and frown, untidy curly red hair and two alien plant horns with smoke coming out of them and other alien plants on a red painted background. The whole surface is covered.

Types of depiction

Metaphoric depiction.

Subtype: Metaphoric portraits.

Composed from the imagination.

Concepts depicted

Threat of alien plants to indigenous plants; the question of their co-existence.

Interview: "This side is indigenous and this girl's very pretty and It's really nice and this side [alien invasive] is all rough and horriblethis girl's got horns ...I put the question mark in to say,an alien becoming an indigenous's friend - why couldn't they be? The alien is all angry with the world - it's hard for her to ...throw down indigenous things and to bring in the aliens.doesn't want to be friends with this one" [indigenous]. Fuller quote below in "Personal response expressed about the concepts".

Written work: "Well the two girls in the picter were kind of in war, one was happy, one was angry, one was Pritty, one was seery. So all the time there was nothing in comen."

[*Environmental educationalist (Wendy Hitchcock), (08/08/04):* "What's interesting is that she said she wanted it to be ugly but it came out frightening. And maybe these look like devil's horns to me, but maybe that is something that's not good and aliens are not good.The untidiness of this is also quite interesting. Did you talk about the growth and the thickness of alien growth?But now she's used alien plants and these are indigenous plants for the indigenous ones, and she's obviously got that right which I think that is a good thing."]

Personal response expressed about the concepts

The threat of a rough, horrible, angry alien plant (which has a difficult time through having to keep on growing and overcoming the indigenous plants) and its threat to a pretty, nice, indigenous plant which has an easy time; also the question of their possible co-existence when they have nothing in common.

Interview: As quoted above under "Concepts depicted" - fuller quote given here which contains more of the personal response: "Well this side is indigenous and this girl's very pretty and she's got bows in her hair and its really nice and this side is all rough and horrible and it's got all sort of spiky things and this girl's got horns and all sorts of horrible things like that.I put the question mark in to say, I know that this couldn't happen but I'm saying, representing two girls friends, in a way of doing that. An alien becoming an indigenous's friend. Why couldn't they be? But I mean the indigenous girl is all happy and the alien is all angry and what I say is angry with the world."

Later in the interview: "And aliens, it's hard for him to grow and I mean it's hard for her to grow and it's hard for her to keep, to throw down indigenous things and to bring in the aliens. That's what she's trying to do. But this one [points to indigenous girl] wants to be friends with this one [points to alien girl] but the question mark is, this one doesn't want to be friends with this one because half of the pink is just to show that she's lighter and the red is to show that it's very, very, very heavy with the world."

Written work: As quoted above under "Concepts depicted"

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* "What's interesting is that she said she wanted it to be ugly but it came out frightening. And maybe these look like devil's horns to me, but maybe that is something that's not good and aliens are not good.The red colour here symbolises the angriness of evil and bad things."]

Use of indigenous/alien plant material and feathers

- Used plant material in the following ways:
 - (i) It is used for its shape to represent something other than itself (the indigenous reed material for the alien girl's hair – during the production, she said knew reeds were indigenous but there was not the right sort of alien material for the alien girl's hair, as recorded in the teacher's notes)
 - (ii) It represents a larger group to which the plant or bird of which it is a part belongs, in an artwork with a metaphoric depiction (alien and alien invasive plant material used to represent invasive alien plants generally; indigenous plant material to represent indigenous plants generally).
- Used both indigenous and alien plant material.
- Indigenous/alien plant materials used appropriately to express the concept, except for the reeds which were used because they were the right shape (see (i) above).



Summary of what is evident in the artwork and the child's explanations

The artwork shows a gloomy, neglected garden with grass, wilted flowers, tree trunk (which is what is left after chopping down the tree for firewood), tipped over rubbish bin with a fly nearby, pale sky with a cloud and leaves blowing in the wind, as well as a man who is sad and crying because he didn't realise that not looking after his garden would result in such a lack of beauty. Savannah and Michelle made their artworks as a matching pair.

Record of analysis

Description of visual content evident in artwork

Grass fills the bottom third. On the baseline of the top third stands a crying man (made from beeswax, with a tear drop on his cheek and a down-turned mouth), three bulb-like flowers (wilted), a tree trunk, cans that have fallen out of a tipped over rubbish bin with a fly above (the fly, cans and part of bin are beeswax). In the sky, brown leaves are blowing in the wind (the latter indicated by lines) and a large sun peeps out from behind a cloud in the right hand section. The whole surface is covered with paint. Savannah and Michelle produced their artworks as a matching pair.

Types of depiction

Literal depiction.

Subtype: Landscape (garden scene).

Composed from the imagination.

Concepts depicted

Beauty of a garden; care of plants and a garden; interdependence of people and plants; lack of enjoyment of plants and a garden.

Interview: "My little man is a bit sad because he never looked after his garden properly and now it's turned into a disgusting garden.... Well the flowers are dead because you never watered them properly.... And the tree... he cut off the tree because he needed it for fire wood and he never really cared about it.... The rubbish bin has tipped over and all the junk has come out of it. That's a fly... the birds don't like his garden because it's all dirty..... It's sort of like a disgraceful garden so then it must be dark and gloomy."

Written work: "My Picture is about the beauty of a garden and that you must take care of your garden. You must pick up rubbish that lying all over your garden. You must keep your garden neat and tidy. And that you must never stop watering your flowers."

[Two stage drawing of a flower after the writing. Each stage has a caption: "1 you watered your flowers"; "2 did not water your flowers".]

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "Rubbish out of the bin and the plants knocked over and the plants growing here and this one doesn't have any animals..... okay, so a fly is indicative of something bad... a sad person there." Also: "They've homed in on what you were saying about looking after the environment" - referring to both Savannah and Michelle's artworks as they are paired]

Personal response expressed about the concepts

The need for never stopping to care for the plants and a garden, the neglect of which would lead to a disgusting, dirty, disgraceful, dark and gloomy garden that's a real mess and causes sadness resulting in learning to tidy it up.

Interview: As quoted above under "Concepts depicted". Also: "The man's very sad, I don't know why, but his garden's been a real mess and He didn't really know that it would be like that... [He's going to] learn to tidy it up."

Written work: As quoted above under "Concepts depicted"

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* As quoted above under "Concepts depicted"]

Use of indigenous/alien plant material and feathers

Did not use.



Summary of what is evident in the artwork and the child's explanations

The artwork shows a garden scene with a large central flower decorated with beeswax with beeswax bees and a butterfly collecting pollen, thereby helping the flower. In the sky, there is the sun on the left-hand side and clouds with rain on the right-hand side. At bottom there is grass, with ants on the left. The artwork is about the beauty of interdependence in nature and the dependence of plants on natural conditions.

Record of analysis

Description of visual content evident in artwork

A plant with a very large flower has a yellow centre with an unknown object painted on it (possibly an insect) and petals in blue or red with beeswax blobs of the same colour. Bees and a butterfly are close to the flower. In the top left is a sun with rays. In the top right there is a cloud with rain going all the way to the ground. There is a bottom strip of grass, with ants on the left hand side. The rest of the space is filled with blue strokes for the sky. The whole surface is covered with paint except for spaces between items and paint strokes.

Types of depiction

Literal depiction.

Subtype: Landscape (garden scene).

Composed from the imagination.

Concepts depicted

Interdependence of animals (insects) and plants as seen in pollination; beauty of interdependence in nature; dependence of plants on natural conditions.

Interview: "It just explains the beauty of how the animals help the flowers and the trees and nature... how they work together... The bees help the flowers by collecting honey and nectar... It just helps the pollen... Plants need rain to grow and they need sunshine..... The butterfly also does about the same job. well drinks the nectar of the flower."

Written work: "My picture is about how plants and animals work together to help each other. For example flowers help bees and beese help flowers."

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "She's obviously understood about the animals and the interaction between the insects and the plants and then the need for rain and sun, portrayed on either side."]

Personal response expressed about the concepts

The beauty of the plants and animals working together to help each other through pollination, the ants as part of nature, as well as how plants need rain and sunshine.

Interview: As quoted above under "Concepts depicted". Also "Those little ants have just, I just drew ants there because, and it's nature."

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* Also "This is a really lovely representation, a beautiful big central plant with a lovely flower."]

Use of indigenous/alien plant material and feathers

Not used.

Nicholas – Grade 5; 11 Years 2 Months (Workshop 16/07/04)

[Has attention deficit hyperactivity disorder (ADHD) and is usually on Ritalin, but not during the workshop]



Summary of what is evident in the artwork and the child's explanations

The artwork shows a large blue vase strongly coloured in blue pastel containing endangered plants (represented by indigenous plant material and feathers) with a large strongly coloured red cross. The words 'Never keep endangered plants by picking them' are painted in black. In the background are vigorous green strokes symbolically representing the land's anger with people who have caused the extinction of plants through removing them. The picture represents the need to care for nature and protect it.

Record of analysis

Description of visual content evident in artwork

There is a large central blue vase (strongly coloured with pastels) containing indigenous plants and two guinea fowl feathers on a background covered with grass blades (strokes of green pastel). In the foreground is a cross (strongly drawn in red

pastel) with the words "Never keep indangered plants by piking them". Whole surface covered.

Types of depiction

Literal depiction, with symbolic background.

Subtype: Still life.

Composed from the imagination.

Concepts depicted

Threat to endangered plants through picking; management of endangered plants; endangerment; extinction; detrimental effect on the land; culpability of people who do picking of endangered plants; care of nature with its plants ; protection of nature with its plants.

Interview: "The cross is.... just telling us again that we should never pick endangered plants... The cross is about the writing [on the artwork]: 'Never keep indangered plants by piking them'... These are endangered plants that people have been keeping and now they've all died out.... The green is for the land is angry with these people."

Written work: "This picture represents anger for people keeping indangered plants by picking them out of there inviroment. We should all take care of nature. We must protect nature and keep it safe. [After the writing there was a drawing of three flowers on grass, a notice on a plinth "forbindin to touch" and a path, with one person sitting on a bench and another walking.]"

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "There's quite a lot of symbols in this image. It's a very strong picture of a container with the plants that have been picked, representing the endangered plants that one shouldn't pick, with a strong cross, indicating that one shouldn't do that."]

Personal response expressed about the concepts

The threat to endangered plants by dying out because of people picking them, which should never be done and about anger towards these people for the detrimental effect on the land; also the necessity of care and protection of nature with its plants and keeping it safe.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* As quoted above under "Concepts depicted". Also: "I found the green indicating untidiness and anger quite interesting because I would never have picked that up. To me it looks as it it's in the natural environment with just plants or grass in the background but he seemed to be quite clear as to what it was.But he's obviously a deep thinking, feeling kind of person. Very strong: You don't do this!"]

Use of indigenous/alien plant material and feathers

- Used plant material and feathers in the following ways:
 - (i) It is used for its shape to represent something other than itself (guinea fowl feathers for endangered plants).
 - (ii) It represents itself but not as a species type (twigs with leaves and twig with flowers represent endangered plants).
- Used only indigenous plant material and feathers.
- Used plant material and feathers appropriately to express a concept.

Norman – Grade 6; 11 Years 4 Months (Workshop 15/07/04)
[Lives in East London in the Republic of South Africa]



Summary of what is evident in the artwork and the child's explanations

The artwork is a land and seascape showing a shoreline with grass, flowers, palm trees (using indigenous plant material), sand, sea and sunset. The picture symbolises the beauty of nature, as well as its possible permanent destruction and with it people as well.

Record of analysis

Description of visual content evident in artwork

There is a shoreline with grass, flowers, palm trees, sand, sea and sunset. Paint and pastel covers whole surface. The trees and flowers are from indigenous plant material.

Types of depiction

Literal depiction with symbolic meaning.

Subtype: Landscape (land and seascape)

Composed from the imagination.

Concepts depicted

The beauty of nature and its possible permanent destruction of nature and its beauty; interdependence of people and nature.

Interview: "Well, this is kind of the beauty of nature and if we destroy it we can't get it back."

Written work: "Nature is a wonderful and beautiful thing and yet if we do not do anything about the fact that we are destroying it and with it us as well."

[Environmental educationalist (Wendy Hitchcock). (08/08/04): "Very good sense of going into the sunset with beauty part of what we need in life, this world. So he's understood your concepts quite well, I think."]

Personal response expressed about the concepts

The wonder and beauty of nature and its possible permanent destruction: the interdependence of people and nature.

Interview: As quoted above under "Concepts depicted"

Written work: As quoted above under "Concepts depicted"

Use of indigenous/alien plant material and feathers

- Uses plant material in the following ways:
 - (i) It is used for its shape to represent something other than itself (yellowwood leaves for palm tree fronds; silvertree leaves for palm tree trunks);
 - (ii) It represents itself but not as a species type (helichrysum flowers for flowers in the grass).
- Used only indigenous plant material.
- Used indigenous plant material appropriately to express concepts.

Rebecca – Grade 7; 12 Years 10 Months (Workshop 15/07/04)
[Lives in East London in the Republic of South Africa]



Summary of what is evident in the artwork and the child's explanations

The artwork is a symbolic depiction of the threat of alien plants to indigenous plants by overpowering them and pushing them out of the circles (which symbolise life), thereby killing them. Three orange circles have flower motifs in them consisting of petals (parts of alien plants) which are pushing out of the centres consisting of indigenous plant material. Outside of the circles, in an area coloured red, there is indigenous plant material which has already been pushed out.

Record of analysis

Description of visual content evident in artwork

There are three orange circles. (two large, one small), all with indigenous plant material in the centre surrounded by radiating alien plant material [like "flowers" (written work)]. In the red space outside the circle there is indigenous plant material. The whole surface is covered by paint and pastel. "There is a strong sense of design here with the circles" (*Environmental educationalist (Wendy Hitchcock), 08/08/04*).

Types of depiction

Symbolic depiction.

Subtype: Motifs as symbols (circle of life, flowers). Items represent that of which they are a part (alien and indigenous plant material).

Composed from the imagination.

Concepts depicted

Threat of alien plants to indigenous plants; extinction of indigenous plants.

Interview: "In the middle it's indigenous and then the aliens surrounding it and taking it away.....that's the circle of life and it's pushing the indigenous stuff away....the aliens are pushing the indigenous stuff out."

Written work: "My picture is about aliens and indigenous plants. Basically the aliens are pushing out the indigenous plants. I drew the flowers with the aliens as petals which were overpowering the indigenous "middle" part of the flower. I drew my flowers in a sort of circle which I called "The circle of life" where the aliens were pushing out the indigenous plants which [act] was killing them."

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* "She's quite clear that we have to get rid of the aliens". Additional comment on 09/08/04: "Okay, it's pushing it out. Well then that comes through much more clearly because these are aliens there and in each case it's pushing in... That makes sense." (Refers to alien plants pushing in on indigenous plants in the centre of the circle thereby pushing them out of the circle.)]

Personal response expressed about the concepts

The threat of extinction by alien plants to indigenous plants through overpowering, pushing out and killing the plants.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* As quoted above under "Concepts depicted".]

Use of indigenous/alien plant material and feathers

- Used plant material in the following way: It represents a larger group to which the plant or bird of which it is a part belongs, in an artwork with a symbolic depiction (alien invasive plant material and indigenous plant material representing alien invasive vegetation generally and indigenous vegetation generally).
- Used both indigenous and alien plant material.
- Indigenous/alien plant material used appropriately.

Sasha – Grade 6; 11 Years 7 Months (Workshop 16/07/04)
[Has cerebral palsy, affecting slightly her left arm and cognitive abilities]



Summary of what is evident in the artwork and the child's explanations

The artwork is a landscape of the countryside with an advancing fire having destroyed plants on the left hand side of the picture (brown indigenous plant material) and at the back on the right-hand side, so that there is only one tree remaining, and will go on to burn the plants at the front (all indigenous plant material).

Record of analysis

Description of visual content evident in artwork

On the left of the picture, there is a fire, with brown plant material in the bottom third, and two columns of flames highlighted with painted plant material. On the right there is grass, with erica plants and a tree at the back. There is a sun drawn in pastel with beeswax centre. The whole surface is covered with paint or dried plant material.

Types of depiction

Literal depiction.

Subtype: Landscape (countryside).

Composed from the imagination.

Concepts depicted

Threat of advancing fire to indigenous vegetation

Sasha's concept is simplified compared to David's as she does not include its relationship to alien invasive vegetation.

Interview: "A fire has started on the one side of this field and it hasn't got to this side yet and it's also burnt the back of the field so there's only one tree left on the other side."

Written work: "My picture is about a fire that has started in the field and has only burnt the one side, but I'm sure it will also burn the other side, and there is only one tree left on the other side of the field."

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "Obviously a big fire going here and a lot of burnt plants down here And then again the strong representation of the ericas here being the indigenous plants that haven't burnt and one tree with silver leaves.... So a lot of care with her big fire there and obviously the smoke."]

Personal response expressed about the concepts

The threat of fire to indigenous vegetation and the certain advance of fire.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* As quoted above under "Concepts depicted"]

Use of indigenous/alien plant material and feathers

- Used plant material in the following ways:
 - (i) It is used for its shape to represent something other than itself (silvertree leaves for branches; helichrysum twigs for flames).
 - (ii) It clusters to form the right shape (bark pieces for tree trunk).
 - (iii) It represents itself but not as a species type (bark for tree trunk; brown indigenous plant material for burnt vegetation).
 - (iv) It represents itself as a species type (erica twigs for erica shrubs).
- Used only indigenous plant material.
- Used indigenous plant material appropriately to express a concept.

Savannah – Grade 4; 9 Years 1 Month (Workshop 16/07/04)
[Youngest in group]



Summary of what is evident in the artwork and the child's explanations

The artwork shows a beautiful garden with a painted tree, flowers and grass. In the blue sky is a bird and large sun with rays. There is also a rubbish bin and a smiling lady who is happy and enjoying her garden because she has looked after her garden and the plants. Savannah and Michelle made their artworks as a matching pair.

Record of analysis

Description of visual content evident in artwork

Grass fills the bottom third. On the baseline of the top two-thirds stands a large archetypal tree, three bulb-like flowers, a happy smiling lady (beeswax) and a rubbish bin (beeswax). In the blue sky, a bird is placed centrally and there is a large sun with rays in the right hand section. The whole surface is covered with paint. Savannah and Michelle made their artworks as a matching pair.

Literal depiction.

Subtype: Landscape (garden scene).

Composed from the imagination.

Concepts depicted

Beauty of plants; care of plants and garden; enjoyment of plants and a garden; interdependence of people and plants.

Interview: "My half is like your beautiful garden and stuff. If you don't take care of your garden it won't come up nicely....It's about a beautiful garden, and my person is happy because she's been looking after her garden and it's not a big disgrace. She

even put some bins in the garden to pick up litter that people throw away..... There's nice trees and flowers and stuff, she's giving them water. And now she has a bird living in the trees."

Written work: "My picture is about the beauty of plants and the beauty of the plants may bring happiness into your life."

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "You can see clearly we've got a nice bright sunny picture here with a lovely big tree and a well looked after garden, with rubbish in the bin... a bird here going to the plants and a happy person." Also "They've homed in on what you were saying about looking after the environment"- referring to both Savannah and Michelle's artworks as they are paired]

Personal response expressed about the concepts

The need for care for plants to have a beautiful garden, with the plants bringing happiness into your life as the garden is not a big disgrace.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* As quoted above under "Concepts depicted"]

Use of indigenous/alien plant material and feathers

Not used.



Summary of what is evident in the artwork and the child's explanations

The artwork shows an imaginary flower (made from indigenous and alien plant material) portrayed schematically, on a plain background with decorative corner sections. The artwork represents beauty of flowers and of variety, with the centre part for pollen. The alien plant material represents the threat of the alien plants to indigenous plants.

Record of analysis

Description of visual content evident in artwork

There is a large central symmetrical flower made from mainly indigenous, but also alien plant material, as well as beeswax. The petals do not touch the centre. The background is painted over the whole surface with the corners sectioned off with indigenous by indigenous reeds and painted in a different colour.

Literal (from observation / imagination), metaphoric or symbolic depiction

Literal but imaginary, depiction with decorative background.

Subtype: Schematic imaginary flower.

Composed from the imagination.

Concepts depicted

Beauty of flowers and of variety (also the beauty of the parts for pollination); pollination; threat of alien invasive vegetation to indigenous vegetation. [He put both the aliens and indigenous plants combined together in the artworks "because the alien

are taking over" (interview when returning artwork 14/09/04), added here as he was explaining what his artwork is about)]

Interview: "Lots of little flowers made like a big flower...I put these to be like the petals....and the surrounding I put pollen... That's also pollen.....

Those are petals. Well it's actually put to look nice."

Written work: "Lots of small plants put together to make one big plant. It's got pollon (with nector)."

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* "I think the main thing that comes out is the symmetry and he was trying to create something beautiful which is represented by biodiversity I presume. He seemed to know what all the little bits were in the flower, the pollen, the petals other than that not much more comes to mind."]

Personal response expressed about the concepts

The beauty of flowers including the parts for pollination and of variety; also the threat of alien invasive vegetation to indigenous vegetation.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* As quoted above under "Concepts depicted".]

Use of indigenous/alien plant material and feathers

- Used plant material and feathers in the following ways:
 - (i) It is used for its shape to represent something other than itself (spider gum trumpet and silvertree leaves are petals – interview); the reeds form the line boundaries for the corner decorative feature.
 - (ii) It clusters to form the right shape (helichrysum flowers cluster together to form the pollen at the centre, like a composite flower head).
 - (iii) Used plant material to represent a larger group to which the plant or bird of which it is a part belongs (alien invasive plant material and indigenous plant material for alien invasive vegetation generally and indigenous vegetation generally)
- Used both alien and indigenous plant material.
- Used plant materials to depict a concept: used both alien and indigenous combined together because aliens are taking over (interview when artwork returned 14/09/04).

Solomon – Grade 8; 12 Years 7 Months (Workshop 15/07/04)
[First language is Shona].



Summary of what is evident in the artwork and the child's explanations

The artwork is a metaphoric narrative in a symmetrical pattern, showing alien plants (the outer sections of the page) trying to take over the land occupied by indigenous plants (the inner sections of the page), with the leaves dividing them representing the laws which protect indigenous plants. The alien plants are sending forth seeds in seedcases (drawn in red) which are countered by seeds in seedcases sent forth from the indigenous plants (drawn in green). The different kinds of plants and seedcases represent variety.

Record of analysis

Description of visual content evident in artwork

A centre cross of indigenous leaves is surrounded by a circle of more indigenous leaves. Seeds in cases represented by green pencil crayon and beeswax radiate from the centre piece to the circle of leaves. In the outside area is alien plant material, from which red pencil crayon and beeswax seeds in cases converge to the circle of leaves. The background is not painted. The artwork is symmetrical.

Metaphoric depiction.

Subtype: Metaphoric narrative in a symmetrical pattern, with items representing that of which they are a part.

Composed from the imagination.

Concepts depicted

Threat of alien plants to indigenous vegetation; regulation of alien plants; protection of indigenous plants; variety of plants (Solomon also had different seedcases for the various plants).

Interview: "It's about aliens trying to take over the area which belongs to the indigenous plants. The indigenous plants are protected by the laws... which prevent all the aliens from totally controlling the whole place. Later on in interview: It's the more the different kinds of aliens and it's the indigenous trees" [variety of aliens and indigenous trees].

Written work: "My art is about aliens and indeginous trees. The aliens ... are trying to take over all the land occupied by the indeginous trees or plants. The boundary represents laws which protect the indeginous plants."

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* "What comes out very strongly is this central part where the indigenous plants are and they're being invaded on all sides by the aliens.So he's taken principles and just translated them.....This interaction is quite strong here. Coming in and trying to invade this circle. And you said these were laws. Tribal customs are traditionally you have a circle to keep the lawless on the outside and if you transgress you're going to be chucked out and maybe the baddies are always trying to get into the centre.....I think a circle is a very important symbol in that."]

Personal response expressed about the concepts

The threat of alien plants to the area which belongs to the indigenous plants and about the need for laws to protect indigenous plants from the threat of alien plants controlling the whole area; also the variety of plants.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 08/08/04:* As quoted above under "Concepts depicted". Also: He's put a lot of energy into what he is doing here and he obviously really has enjoyed portraying the principles here. It is a very vibrant work and obviously very honest."

Use of indigenous/alien plant material and feathers

- Used plant material and feathers in the following ways:
 - (i) It is used for its shape to represent something other than itself (the yellowwood leaves form a boundary ring).
 - (ii) Used plant material symbolically to represent a larger group to which the plant or bird of which it is a part belongs (alien invasive plant material and indigenous plant material for alien invasive vegetation generally and indigenous vegetation generally.)
- Used both indigenous and alien plant material.
- Appropriate use of indigenous and alien plant material to depict the concepts.

Susan – Grade 5; 10 Years 9 Months (Workshop 16/07/04)
[Lives in Port Elizabeth in the Republic of South Africa]



Summary of what is evident in the artwork and the child's explanations

The artwork is a metaphoric depiction with plant material clustered randomly and single items with a background of blue and purple dots, representing the sky at sunset. Strips of green beeswax line parts of the bottom of the page, probably representing grass. A beeswax bird, butterfly and bees interact with the plants (the bird is eating berries, the bee eating pollen and the butterfly sitting on the plants). The artwork shows the beauty of indigenous plants and the interdependence of animals and plants as it would look like if there were not any alien plants.

Record of analysis

Description of visual content evident in artwork

A variety of plant material, mainly in clusters, but also single items, are scattered over the page. A beeswax bird, butterfly and bee interact with the plants. Blue and purple dots fill the spaces in between. Green beeswax strips line parts of the bottom of the page.

Types of depiction

Metaphoric depiction, with literal elements.

Subtype: Random clusters and single items on a background.

Composed from the imagination.

Concepts depicted

Beauty in the variety of indigenous plants; interdependence of animals (insects, birds) and plants; threat of alien vegetation to indigenous vegetation; pollination.

Interview: "The beauty of indigenous plants and all the animals that sits on the plants and eat the berries and stuff that come off the plant... This is what it would really look like if there were no alien plants all over the place." Later on in the interview: "It's pretty and it's colourful, all the plants look like if there weren't any aliens."

Also: "A butterfly..... a bird flying over and that's a bee..... This one eats the pollen and this one takes the berries and this one just sits on the plants..... I think it fertilizers the eggs [seeds] so they can grow."

Written work: "My picture is about the beauty of indigenous plants and what it would look like if there weren't any alien plants. The back round is mainly purple because the sun is setting."

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "A lovely, busy, full picture here. You can see she's really enjoyed thinking about what she's going to put down here. Lots of different plants, lots of colour and lots of animals. And the interaction is also quite nice here..... But she's obviously had fun going through this selection of things that you've had for her to choose from. There's very little repetition of stuff. She's picked up on the diversity"]

Personal response expressed about the concepts

The beauty and interdependence (including pollination) of the variety of colourful, pretty indigenous plants and animals (birds and insects) if there was not any alien vegetation.

Interview: As quoted above under "Concepts depicted".

Written work: As quoted above under "Concepts depicted".

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* As quoted above under "Concepts depicted"]

Use of indigenous/alien plant material and feathers

- Used plant material in the following ways:
 - (i) It is used for its shape to represent something other than itself (the helichrysum flower for a plant with berries that the bird is eating).
 - (ii) It represents the plant of which it is a part (various pieces of plant material for the whole plants).
- Used only indigenous plant material (except for a single instance of an alien plant which was in the box with indigenous flowers)
- Used indigenous plant material appropriately to express concepts.



Summary of what is evident in the artwork and the child's explanations

The artwork shows a tree (made from indigenous plant material) which represents our national tree, with the whole picture showing that our country is beautiful. The mustard for the ground represents the aliens being removed and thereby controlled. The green between the leaves and the yellow radiating out from them represent growth, health and beauty. The blended orange also represents beauty.

Record of analysis

Description of visual content evident in artwork

There is a large central tree made from an indigenous twig for the trunk and silver leaves for the branches, with the entire background coloured with pastels, made up of mustard for the ground, green between the branches, yellow radiating from the branches, an orange background where the sky would usually be and a slither of green above the ground. "Our country is beautiful" is written at the base.

Literal depiction with symbolic colour.

Subtype: Landscape (undefined).

Composed from the imagination.

Concepts depicted

Beauty of our country as represented by our national tree; threat of alien vegetation to indigenous vegetation; control of alien invasive vegetation.

Interview: "It's about that our country is beautiful but it won't be beautiful if we do not kill the aliens and take control of them.....This is our mini national

tree.....Orange is also this whole entire bits like blending into each other to show the country is beautiful."

Written work: " picture is about S.A., our country is beautiful. So I drew a picture representing our country being beautiful. The musterd is the aliens being killed and the blended colors means groth and health and the tree is our mini African tree."

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "You may not know that that's the aliens that have been cleared, but once he's told you that then that's quite clear."]

Personal response expressed about the concepts

The beauty of our country and our trees as seen in growth and health, as well as the threat of alien vegetation to indigenous vegetation and consequently the need to kill alien plants by uprooting, burning or utilising them.

Interview: As quoted above under "Concepts depicted". Also "Green and yellow is a nice colour and it's like a healthy colour We chuck away alien trees but we leave our trees to grow..... we actually put poison on them [alien trees], pull them out, burn them. Use them for stuff."

Written work: As quoted above under "Concepts depicted". Also "...and i thought why do aleins have too come to S.A."

[*Environmental educationalist (Wendy Hitchcock), 09/08/04:* "It just comes through quite clearly that he feels strongly about this. Strong colours, strong design, no little itty bitty things and all the aliens have been cleared. Which is clear and simple and it's very beautiful..... Obviously quite a forthright person."]

Use of indigenous/alien plant material and feathers

- Used plant material in the following way: It is used for its shape to represent something other than itself (an agapanthus twig for the trunk of the tree; silvertree leaves for the branches).

[The following was a possibility - It represents that of which it is a part (Tao agreed with the teacher that the tree could be a silvertree for a national tree, but probably intended to represent the yellowwood tree, as he was well informed about the natural environment. This is confirmed by his statement that the tree is our national tree, the yellowwood in the interview when the artwork was returned - 09/09/04).]

- Used indigenous plant material appropriately to express a concept.
- Used only indigenous plant material.



Summary of what is evident in the artwork and the child's explanations

The artwork shows a building scene with a man in a bulldozer destroying the indigenous plants which could make the plants extinct or endangered. A builder is standing nearby. There is a large sun in the blue sky.

Record of analysis

Description of visual content evident in artwork

A bulldozer is knocking down plants (indigenous plant material). There is a larger man in the bulldozer and a smaller man standing close to the bulldozer. A very large sun fills more than two thirds of the sky. The whole surface is covered with paint and pencil.

Types of depiction

Literal depiction.

Subtype: Building scene (bulldozer clearing scene).

Composed from the imagination.

Concepts depicted

Threat of building to plants; extinction of plants; endangered plants.

Interview: "It's about to bulldoze something here..... wiping out the plants and stuff....It could make the plants extinct, so extinction....or rather endangered."

Written work: "Some people were bulldozing land to build houses on. They were killing the plants that were there. This could cause extinction or the plants could become endangered."

[*Environmental educationalist (Wendy Hitchcock), 08/08/04*: “This is a wonderfully graphic picture and she obviously really took it to heart that bulldozers can cause destruction with plants growing here and then being thrown into the background. A very strong portrayal of destruction here.”]

Personal response expressed about the concepts

Building as a threat to plants by killing them / wiping them out, making them extinct or endangered.

Interview: As quoted above under “Concepts depicted”.

Written work: As quoted above under “Concepts depicted”.

[*Environmental educationalist (Wendy Hitchcock), 08/08/04*: “Obviously really took it to heart that bulldozers can cause destruction with plants growing here and then being thrown into the background. A very strong portrayal of destruction here. She feels it quite fiercely.”]

Use of indigenous/alien plant material and feathers

- Used plant material in the following way: It represents a larger group to which the plant or bird of which it is a part belongs, in an artwork with a literal depiction (helichrysum flowers represent plants which could become endangered or extinct, as ascertained from interview).
- Used only indigenous plant material.
- Used indigenous plant material appropriately to express a concept.

Appendix 3

COLLATION OF CONCEPTS DEPICTED

Clustering of Concepts Dominant in Each Artwork

- For each child, the dominant concept depicted in artwork is followed by the related associated concepts in brackets.
- Attention was paid to the words used by the children as well as to the exact meanings of terms used for the headings and subheadings.
- Where two concepts (or two aspects of a concept) were given equal weight or were indivisible, the child's name was listed twice under headings.

Clustering of dominant concepts 15th July 2004

Threat

Threat of invasive alien vegetation to indigenous vegetation

- Carey: Threat of alien vegetation to fynbos (control of alien vegetation; right of fynbos to remain; destruction of fynbos by building (development).
- Iqra: Threat of alien plants to indigenous plants (also protection of indigenous plants).
- Manon: Threat of alien vegetation to indigenous plants (also discrimination between threatening and non-threatening alien vegetation; variety of indigenous plants).
- Melissa: Threat of alien plants to indigenous plants (also the question of their possible co-existence).
- Rebecca: Threat of alien plants to indigenous plants (also extinction of indigenous plants).
- Solomon: Threat of alien plants to indigenous plants (also regulation of alien plants; protection of indigenous plants; variety of plants).

Threat of development to indigenous vegetation

Zaitoon: The threat of building to plants (also endangered plants; extinction of plants).

Threat of extinction of indigenous vegetation

Gregory: Threat of extinction to plants from people's actions (also the culpability of people who cause the threat; the threat of pollution).

General threat to nature

Norman: Possible permanent destruction of nature and its beauty (also interdependence of people and nature). See also under "Beauty of nature".

Beauty

Beauty of nature (general)

Kim: As above subheading. See also under "Beauty of nature (especially ideal nature)".

Norman: As above subheading (also interdependence of people and nature). See also under "General threat to nature".

Beauty of nature (especially variety)

Jenna: Beauty in the variety of plants (also interdependence in nature).

Shahied: Beauty of flowers and of variety (also the beauty of the parts for pollination; threat of alien plants to indigenous vegetation).

Beauty of nature (especially interdependence and dependence)

Jodie: Beauty of nature; dependence of people on animals; dependence of animals on plants; pollination; interdependence of people and plants (also care of flowers; gratitude for the world).

Lucy: As above subheading (also variety of plants and animals). See also under "Interdependence of plants and animals".

Beauty of nature (especially ideal nature)

Kim: Plants and animals in ideal nature. See also under “Beauty of nature (general)”.

Creation

Creation of new species

Andy: Creation of new species (also extinction of some new species).

Interdependence

Interdependence of people and nature

Charles: Interdependence of people and plants/animals (also protection of plants, gratitude towards plants; care for all plants; control of alien vegetation).

Interdependence of plants and animals

Lucy: Interdependence of plants and animals (also variety of plants and animals). See also under “Beauty of nature (especially interdependence)”.

Clustering of Dominant Concepts 16th July 2004

Threat

Threat of invasive alien vegetation to indigenous vegetation

Brian: Threat of alien plants to indigenous plants (also threat of fire to indigenous plants; the variety of indigenous plants; most alien plants comes from across the sea).

David: Threat of invasive alien plants to indigenous plants through fire and taking over the land (also pollution; extinction of indigenous plants; control of invasive alien plants; destruction of beauty of South Africa with its indigenous plants through invasive alien plants; destruction of habitat through invasive alien plants; care of indigenous plants; new species arising because of control of invasive alien plants; enjoyment of nature).

Threat of picking or poaching to indigenous vegetation

Nicholas: Threat to endangered plants through picking (also endangerment; extinction; detrimental effect on land; culpability of people who do picking of endangered plants; care of nature with its plants; protection of nature with its plants; management of endangered plants).

Threat of fire to indigenous vegetation

Sasha: The threat of advancing fire to plants.

Threat to of development to nature

Julian: Threat of development and pollution to the world including plants (also management of development; management of vegetation; care of plants; endangered plants; responsibility towards the world).

Beauty

Beauty of nature (especially of indigenous vegetation)

Marina: Beauty of indigenous plants in Cape Town and Africa (also threat of invasive alien vegetation to indigenous vegetation; extinction; pollination; dependence of plants on natural conditions).

Beauty of nature (especially variety)

Judy: Beauty of nature, including the variety as well as number of plants and animals (insects, birds). See also under “Variety of plants and animals”.

Susan: Beauty of variety of indigenous plants (also pollination; threat of alien vegetation to indigenous vegetation). See also under “Interdependence of animals and plants”.

Beauty of nature (especially of a region)¹

- Alice: Beauty of nature, especially plants, in our country (also beauty of variety of plants; care of nature; conservation).
- Tao: Beauty of our country as represented by our national tree (also threat of alien vegetation to indigenous vegetation; control of alien vegetation).

Beauty of nature (especially with regards to care)

- Michelle: Beauty of a garden; care of plants and a garden (also interdependence of people and plants; lack of enjoyment of a garden).
- Savannah: Beauty of plants; care of plants and a garden (also interdependence of people and plants; enjoyment of plants and a garden).

Variety

Variety in nature

- Ashleigh: Variety in nature with its different types of plants.

Variety of plants and animals

- Judy: The variety as well as number of plants and animals (insects, birds).
See also under “Beauty of nature (especially variety)”.

Interdependence

Interdependence of plants and animals

- Kelly: Interdependence of animals and plants in nature including pollination (also variety).
- Natalie: Interdependence of plants and animals as seen in pollination (also beauty of interdependence in nature; dependence of plants on natural conditions).
- Susan: Interdependence of animals (birds, insects) and plants; (also pollination; threat of alien vegetation to indigenous vegetation). See also under “Beauty of nature (especially variety)”.

¹ Not a “bioregion” but a region as indicated by the child, such as “our country” or “Cape Town”.

Dependence

Dependence of animals on plants and natural conditions

Lindi: Dependence of animals (including birds and insects) on plants and natural conditions (also the self-protection of birds from rain; variety of life; love for nature and animals).

Clustering of Concepts Associated with Dominant Concepts

Clustering of concepts associated with dominant concepts 15th July 2004

Threat

Threat of invasive alien vegetation to indigenous vegetation

Threat of alien vegetation indigenous vegetation (Shahied)

Limits of the threat of invasive alien vegetation to indigenous vegetation

The right of fynbos to remain (Carey); discrimination between threatening and non-threatening alien vegetation (Manon); the question of their possible co-existence (Melissa)

Threat of pollution to nature

Threat of pollution (Gregory)

Threat of development to indigenous vegetation

Destruction of fynbos vegetation by people through building [development] (Carey)

Endangered indigenous vegetation

Endangered plants (Zaitoon)

Extinction of indigenous vegetation

Extinction of some new species (Andy); extinction of indigenous plants (Rebecca); extinction of plants (Zaitoon);

Interdependence

Interdependence of plants and animals

Beauty of the parts for pollination (Shahied)

Variety

Variety of plants and animals

Variety of plants and animals (Lucy); variety of indigenous plants (Manon); variety of plants (Solomon);

Control

Control of invasive alien vegetation

Control of alien vegetation (Carey); regulation of alien plants (Solomon)

Protection

Protection of plants

Protection of plants (Charles)

Protection of indigenous plants

Protection of indigenous plants (Iqra, Solomon)

Care

Care for nature¹

Care for all plants (Charles)

Care of nature²

Care of flowers (Jodie)

Gratitude

Gratitude towards nature and the world

Gratitude towards plants (Charles); gratitude towards the world (Jodie);

¹ In the sense of having caring feelings towards nature.

² In the sense of physically looking after nature.

Responsibility

Responsibility for nature

Culpability of people who cause the threat (Gregory)

2.2 Clustering of concepts associated with dominant concepts 16th July 2004

Note: Fire as a threat was not mentioned by the teacher on 15th July 2004, but was mentioned on 16th July 2004.

Threat

Threat of invasive alien vegetation indigenous vegetation

Threat of invasive alien vegetation to indigenous vegetation (Marina, Susan, Tao)

Origin of threats of invasive alien vegetation indigenous vegetation

Most alien plants comes from across the sea (Brian)

Results of threats of invasive alien vegetation indigenous vegetation

Destruction of beauty of South Africa with its indigenous plants through invasive alien plants (David); destruction of habitat through invasive alien plants (David)

Threat of fire to indigenous vegetation

Threat of fire to indigenous plants (Brian)

Endangered indigenous vegetation

Endangered plants (Julian, Nicholas)

Extinction of indigenous vegetation

Extinction of indigenous plants (David, Marina); extinction of plants (Nicholas); detrimental effect on land (Nicholas)

Beauty

Beauty of nature (especially interdependence)

Beauty of interdependence in nature (Natalie)

Beauty of nature (especially threat)

Destruction of beauty of South Africa with its indigenous plants through invasive alien plants (David)

Creation

Creation of new species

New species arising because of control of invasive alien plants (David)

Interdependence

Interdependence of people and nature

Interdependence of people and plants (Michelle, Savannah)

Interdependence of plants and animals

Pollination (Marina, Susan)

Variety

Variety of plants and animals

Beauty of variety of plants (Alice); variety of indigenous plants (Brian); variety of nature as in birds and plants (Kelly); variety of life (Lindi)

Control

Control of invasive alien vegetation

Control of invasive alien plants (David); control of invasive alien plants (Tao)

Management of environmental risks

Management of development (Julian); management of vegetation (Julian);

Management of endangered plants (Nicholas)

Protection

Protection of nature

Protection of nature with its plants (Nicholas)

Protection from nature

Self-protection of birds from rain (Lindi)

Care

Care for nature

Love for nature and animals (Lindi)

Care of nature

Care of nature (Alice, Nicholas); care of indigenous plants (David); care of plants (Julian); care of nature with its plants (Nicholas)

Conservation

Conservation of nature

Conservation of nature (Alice)

Responsibility

Responsibility for nature

Responsibility towards the world (Julian); culpability of people who do the picking of endangered plants (Nicholas)

Enjoyment

Enjoyment of nature

Enjoyment of plants (David); enjoyment of plants and a garden (Savannah); lack of enjoyment of plants and a garden (Michelle)

Dependence

Dependence of plants on natural conditions

Dependence of plants on natural conditions (Marina, Natalie)

Habitat***Vulnerability of habitat***

Destruction of habitat through invasive alien plants (David)

Place***Region***

Beauty of South Africa with its indigenous plants (David); beauty of indigenous plants in Cape Town (Marina)

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Appendix 4

COLLATION OF CHILDREN'S PERSONAL RESPONSES EXPRESSED ABOUT THE CONCEPTS

Clustering of Personal Responses Expressed about Dominant Concepts, Together with Associated Concepts

Clustering of personal responses expressed about dominant concepts 15th
July 2004

Personal response expressed about threat

*Personal response expressed about the threat of alien invasive vegetation to
indigenous vegetation*

- Carey: The threat of alien vegetation to the space occupied by fynbos and the need to control the chaotic spread of alien vegetation as fynbos has a right to be there as it was there first and is natural in the place; also about the threat by people of destruction to fynbos through building (development).
- Iqra: The threat of alien plants to indigenous plants and the need to protect the special fynbos plants from being attacked by alien plants.
- Manon: The threat of the destructive, frightening and harmful alien vegetation to the pretty indigenous plants; also that not all alien plants are a threat, as well as the inherent value of the variety of indigenous plants.
- Melissa: The threat of a rough, horrible, angry alien plant (which has a difficult time through having to keep on growing and overcoming the indigenous plants) to the pretty, nice indigenous plant which has an easy time; also the question of their possible co-existence when they have nothing in common.
- Rebecca: The threat of alien vegetation to indigenous vegetation through overpowering, pushing out and killing the plants.

Solomon: The threat of alien plants to the area which belongs to the indigenous plants and about the need for laws to protect indigenous plants from the threat of alien plants controlling the whole area; also the variety of plants.

Personal response expressed about the threat of development to indigenous vegetation

Zaitoon: Building as a threat to plants by killing them / wiping them out, making them extinct or endangered.

Personal response expressed about the threat of extinction to indigenous vegetation

Gregory: The threat of extinction to plants including the threat of pollution and how bad people are who kill the plants.

Personal response expressed about the general threat to nature

Norman: The wonder and beauty of nature and its possible permanent destruction; the interdependence of people and nature. Also under "Personal response about beauty of nature".

Personal response expressed about beauty

Personal response expressed about the beauty of nature (general)

Kim: The wonderful beauty of nature as well as how plants and animals are supposed to live. Also under "Personal response about beauty of nature (especially ideal nature)".

Norman: The wonder and beauty of nature and its possible permanent destruction; the interdependence of people and nature. See also under "Personal response about the general threat to nature".

Personal response expressed about the beauty of nature (especially variety)

Jenna: How beautiful different plants look together and that there is interdependence in nature.

Shahied: The beauty of flowers and of variety including the parts for pollination; also the threat of alien plants to indigenous vegetation.

Personal response expressed about the beauty of nature (especially interdependence and dependence)

Jodie: The beauty of nature which is ours and which we are lucky to have, including the animals which give us company, the dependence of animals on plants for shade and food, pollination and the interdependence of people and plants regarding beauty and care of flowers to make the world colourful and wonderful.

Lucy: The beauty of life as seen in nature with the interdependence of the variety of animals and plants. Also under “Personal response about the interdependence of animals and plants”.

Personal response expressed about the beauty of nature (especially ideal nature)

Kim: The wonderful beauty of nature as well as how plants and animals are supposed to live. Also under “Personal response about beauty of nature (general)”.

Personal response expressed about creation

Personal response expressed about the creation of new species

Andy: The creation of new species and the extinction of some new species; also the joy of creating.

Personal response expressed about interdependence

Personal response expressed about the interdependence of people and nature

Charles: The interdependence of people and plants/animals especially through the plants helping us and our returning the favour by keeping them safe and helping them survive, including alien vegetation by not exterminating it or showing hostility, but by control.

Personal response expressed about the interdependence of animals and plants

Lucy: The beauty of life as seen in nature with the interdependence of the variety of animals and plants. Also under “Personal response about the beauty of nature (especially interdependence)”.

Clustering of personal responses expressed about dominant concepts 16th July 2004

Personal response expressed about threats

Personal response expressed about the threat of alien invasive vegetation to indigenous vegetation

- Brian: The threat of alien plants, mostly from across the sea, breaking up the variety of plants in the nice gardens as well as the threat of fire to the indigenous plants, both resulting in dead plants.
- David: The threat of alien invasive plants to indigenous plants through taking over so much land and through fire (with its destruction and pollution), leading to extinction and the destruction of beauty of South Africa and habitat, resulting in death of animals; also stopping the invaders by pulling out, destroying and not being allowed to grow them, motivated by the necessity of care of indigenous plants, enjoying them but not harming or disturbing them, with important new species arising as a result.

Personal response expressed about threat of picking or poaching to indigenous vegetation

- Nicholas: The threat of endangered plants dying out because of people picking them, which should never be done and about anger towards these people for the detrimental effect on the land; also the necessity of care and protection of nature with its plants and keeping it safe.

Personal response expressed about the threat of fire to indigenous vegetation

- Sasha: The threat of fire to indigenous vegetation and the certain advance of fire.

Personal response expressed about a general threat to nature

Julian: The threat of destruction of trees, incorrect development and pollution to the world in the future including plants, resulting in a dirty world without plants and how we have the responsibility towards the world's future in terms of correct development and the necessity of the care of plants, minimising endangerment, resulting in a clean world with plants.

Personal response expressed about beauty

Personal response expressed about the beauty in nature (especially indigenous vegetation)

Marina: How very beautiful indigenous plants in Cape Town and Africa are, as well as the alien invasive plants destroying and wiping out indigenous plants, pollination and the dependence of plants on natural conditions.

Personal response expressed about the beauty in nature (especially variety)

Judy: The beauty of nature, including the variety and number of plants with their colours and animals (insects, birds)

Susan: The beauty and interdependence (including pollination) of the variety of colourful, pretty indigenous plants and animals (birds and insects) if there was not any alien vegetation. Also under "Personal response about interdependence of animals and plants".

Personal response expressed about the beauty of nature (especially our country)

Alice: The beauty of nature in our country as seen in the variety of all the plants as well as how we can keep it beautiful if we really look after it

Tao: The beauty of our country and our trees as seen in growth and health, as well as the threat of alien vegetation to indigenous vegetation and consequently the need to kill alien plants by uprooting, burning or utilising them.

Personal response expressed about the beauty of nature (especially with regards to care)

Michelle: The need for never stopping to care for the plants and a garden, the neglect of which would lead to a disgusting, dirty, disgraceful, dark and gloomy garden that's a real mess and causes sadness, resulting in learning to tidy it up.

Savannah: The need for care for plants to have a beautiful garden, with the plants bringing happiness into your life as the garden is not a big disgrace.

Personal response expressed about variety

Personal response expressed about variety in nature

Ashleigh: The variety in nature with its different types of plants that make a picture decorative and not boring.

Personal response expressed about interdependence

Personal response expressed about interdependence of animals and plants

Kelly: Interdependence in life and nature between animals and plants (nature's variety), for example, in pollination.

Natalie: The beauty of the plants and animals working together to help each other through pollination, the ants as part of nature as well as how plants need rain and sunshine.

Susan: The beauty and interdependence of the variety of colourful, pretty indigenous plants and animals (birds and insects, including pollination) if there wasn't any alien vegetation. Also under "Personal response about the beauty of nature (especially interdependence)".

Personal response expressed about dependence

Personal response expressed about dependence of animals on plants and natural conditions

Lindi: The importance of nature as seen in the dependence of animals (insects) on plants as well as on natural conditions to survive; also the need for self-protection of birds from rain, the variety of life and love for nature and animals.

Appendix 5

QUESTIONNAIRE

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GETTING TO KNOW MORE ABOUT YOU

What is your name and surname? Write your answer in your favourite colour.

How old are you? Write your answer in another colour that you like.

What is the date of your next birthday? Write your answer in a bright colour.

Make a quick drawing of how you look today, with the clothes you are wearing and with your hair the way it looks today. Spend only about five minutes (there is a clock on my table). Use the colours which are the same as your clothes and your hair. If you want to start again, use the other side of this page.

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ABOUT YOUR HOME

What is your address? Don't give me a postbox number. Write your answer in the colour of your outside roof, wall or door (not white).

Answer these if there is a garden at your home or block of flats:

How does the size of the garden compare to the size of this room? Draw a flower in the left margin right next to your answer in any colour you like.

Much bigger than this room

A little bigger than this room

About the same size as this room

A bit smaller than this room

Much smaller than this room

ABOUT SCHOOL

What school do you go to? Write your answer in the colour of your school's outside roof, walls or door (don't use white).

What Grade are you in? Write your answer in the colour of your classroom's walls, board or floor (don't use white).